ROYAL BOTANIC GARDENS, KEW.

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XXX.—EFFECTS OF THE WINTER ON TREES AND SHRUBS AT KEW.

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The winter of 1908–9 was the severest that has been experienced in the British Isles since 1894–5, and the resulting damage to trees and shrubs grown out of doors has been greater than that of the intervening 13 winters all put together. Experiments are continually being made at Kew as to the hardiness of new or untried trees and shrubs, and it is not until such a winter as the last occurs that their real powers of resisting cold are ascertained. The results, therefore, of a severe winter, although often chastening, are not without value; and it is thought that a few notes relating to the more interesting losses and survivals may be useful. As a matter of fact the list of survivors tells a more serviceable and reliable story than that of the losses. The fact that a certain plant has survived uninjured a certain degree of cold without artificial protection hall-marks it with a corresponding degree of hardiness in the particular place where it grows. But one cannot assume so positively that another plant which has died under the same conditions is correspondingly tender. So much depends on attendant circumstances. Its death may be due to a series of adverse conditions of which the winter's cold is but the culminating one.

It must be admitted, however, that the damage done to vegetation during the winter of 1908–9 was not due so much to long spells of intense cold as to violent alternations between intense cold and unseasonable warmth. The month of October, 1908, was extremely mild, often even summerlike. The thermometer rarely fell below 42° Fahr., and on five occasions it rose to between 70° and 80° in the shade. The consequence of this was, that many shrubs, more especially young and vigorous ones, kept on growing when they should have been consolidating ("hardening off") the growth already made. From the end of October to December 27, the weather continued very mild, and frosts, ranging from 1° to 8°, were registered on six occasions only. But on December 28 the minimum temperature was 24° Fahr.; on the 29th it was 23° Fahr.

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with a heavy fall of snow; and on the 30th the thermometer fell to 10° Fahr. It was, no doubt, to this sudden experience of 22 degrees of frost, following a long period of soft mild days, that much of the damage we have to record was done. On the night of the following day (December 31) it was thawing and raining. The first three weeks of the new year were very mild, but during the last week of January frosts varying from 6 to 12 degrees were registered. February opened mild—on the night of the 3rd the minimum temperature was 51° Fahr.—and continued so until the third week. This had excited some plants, especially Siberian and Manchurian ones, into a premature activity, when the second spell of severe weather occurred. This lasted from the third week of February to the second week of March. On two occasions 13 degrees of frost were registered, and once 18 degrees, these being accompanied by bitter E. and N.E. winds and snowstorms.

From this brief summary it will be seen that the winter has no claim to rank among the severe ones of history. So far as the average mean temperature of the six dark months is concerned, it would probably even be found to rank with the warmer ones. The disasters to vegetation that have occurred are undoubtedly due to that characteristic of English winters (exceptionally pronounced in this instance) which is the bane of all cultivators of extensive collections of hardy exotic plants. This consists, as has already been observed, in violent fluctuations of temperature, which bring about in many plants a state of unrest absolutely opposed to the long winter sleep so many of them enjoy in their native places.

It would serve no useful purpose to go through the full list of killed and injured plants. There are some half-a-dozen great areas whence we obtain the more tender shrubs we attempt to cultivate in the open air, viz., S. Europe, Himalaya, New Zealand and Tasmania, S. America, California, and the S. United States. Among such plants are many which can only be said to exist on sufferance in our gardens, but whose interest or beauty is so great that we are willing to risk their occasional loss; for example, the Ceanothuses, Tree Heaths, Cistuses, Escallonias, New Zealand Veronicas, and (on walls) the Myrtle, Olive, and Pomegranate. These can only be expected to pass through the mildest winters unharmed, and their experiences during the past winter have not differed from those of ordinary winters except in being somewhat more unfortunate than usual. Some shrubs, too, which are indisputably hardy, such as *Cytisus albus*, have had their younger branches killed, owing no doubt to the soft, unripening weather experienced right up to Christmas. These are not mentioned, for the damage is but temporary. The following notes are only intended to record the behaviour of newer and more interesting plants.

New Chinese Plants.—One of the most interesting elements in the horticulture of the present time is the introduction of new plants from Western and Central China. Most of these, it is hoped, will prove hardy enough to take a permanent place in the outdoor garden, and although the last winter can scarcely be said to have afforded the supreme test of our English climate, the results are full of encouragement.

It is especially satisfactory to find that *Davidia involucrata*, for which we are indebted to the enterprise of Messrs. Veitch, has not been injured by cold, even to the extent of a single bud. So much could not be said of several British plants. *Ailanthus Vilmorinii*, although young and only 2 feet high, is unscathed. In the low damp ground behind the Palm House, *Rhododendron rubiginosum* was killed by the rupture of the bark near ground level, but on the higher, drier ground near King William's Temple was unhurt, and has flowered well since. *Jasminum primulinum* was killed to the ground even against a wall, and appears to be of no value for outdoor cultivation. *Magnolia Delavayi*, destroyed in the open ground, is unhurt on an east wall. Several young plants of *Poliothyrsis sinensis* were killed in the nursery, but others are growing well. *Poupartia Fordii*, has survived. The following rare Chinese trees and shrubs, growing in the open ground without any protection, were quite unaffected: *Liriodendron chinensis*, *Euptelea polyandra*, *E. Francheti*, *E. Davidiana*, *Tetracentron sinense*, *Eucommia ulmoides*, *Pertia sinensis*, *Sycopsis sinensis*, *Eleutherococcus Henryi*, *Berberis Wilsonae*, *B. dictyophylla*, *B. acuminata*, *Trachelospermum crocostomum* (on a wall), *Cotoneaster adpressa*, *C. applanata*, *C. moupinensis*, *C. humifusa* (seedlings were injured), *C. bullata*, *C. rugosa* var. *Henryi*, *Viburnum Carlesii*, *V. rhytidophyllum*, *Rosa Hugonis*, *Itea ilicifolia*, *Schizophragma integrifolia*, *Sinofranchetia sinensis* and *Sophora viciifolia*.

A great number of plants have recently been raised from seeds presented to Kew by Prof. Sargent which had been collected by Mr. E. H. Wilson during his last journey in China. Nothing definite can be put on record about them because most of them are unnamed and under numbers only. Further, they had only been planted in the open ground a few months. Most of them, however, have survived, although many have been cut back to ground level.

Coniferae.—This family, as represented in the outdoor garden, is, of course, but little affected by the severest frosts. It is only a few of the uncommon species that need be mentioned. *Libocedrus macrolepis*, a new Chinese species, is killed. *Podocarpus alpina*, a species native of Tasmania, and *P. chilina* from Chile have suffered very little. *Fitzroya patagonica* and *Libocedrus chilensis* are untouched. Of the commoner sorts, *Pinus insignis* was the only one that showed much evidence of damage, and this was confined to its leaves, which remained on the trees but turned a curious rusty brown.

Bamboos.—These afford the worst evidence in Kew of the winter's havoc, and the appearance of the Bamboo Garden at the time of writing (June) makes one doubt whether a large portion of the species are really worth a place in ornamental gardens. Not a single species probably has been killed or even permanently injured, but the top growth of many is entirely dead, and only the underground rhizomes are alive. Others, which on Christmas Day last constituted some of the freshest and certainly most graceful masses of greenery in the gardens, are now leafless stems with no more beauty than a bundle of pea-sticks. And the worst consequence of a season like the past one is, that, so late are Bamboos in renewing

their growth, it is not until after midsummer that they become presentable again. The two most satisfactory species are *Arundinaria nitida* and *A. fastuosa*, which have not suffered in the least. Many of the *Phyllostachys* have been lost to the collection in recent years owing to their flowering and subsequent death. Of those that remain, *P. flexuosa*, *P. nigra*, and *P. Quilioi* have suffered less than any. A curious fact in regard to *P. viridi-glaucescens* is, that the only specimen which has escaped damage is growing on a dry slope. The old *Arundinaria japonica* (commonly known as *Bambusa Metaké*), which on account of its hardiness has been planted about the grounds, is very much disfigured. Among the dwarf species, *Arundinaria pygmaea*, *A. Kumasasa* (or *palmata*), *A. Veitchii*, and *Bambusa tessellata* are but little affected.

Rhododendrons.—Perhaps the most interesting result among Himalayan Rhododendrons is the indifference to the recent winter's cold shown by *R. barbatum*. Some plants, now 6 feet and upwards high, presented to Kew by Sir J. T. D. Llewellyn a few years ago and planted in the Rhododendron Dell, have come through quite unaffected and have flowered this spring. The following N. Indian species also may now be regarded as hardy at Kew :—*Anthopogon*, *arboreum* (var. *Campbelliae*), *campanulatum*, *campylocarpum*, *ciliatum*, *cinnabarinum*, *fulgens*, *glaucum*, *lepidotum*, *niveum*, and *Thomsonii*. *R. triflorum* has almost perished.

Among the Japanese and Chinese species the only total loss is the recently introduced *R. sublanceolatum*. In a low-lying situation *R. rubiginosum* has succumbed, and *R. yunnanense* has lost its foliage. Several forms of the Indian Azalea (*R. indicum*) have flowered exceedingly well in spite of the winter, and there seems to be a promising future in gardens for several small-leaved, hardier sorts. *R. indicum* var. *amoenum* has been grown unprotected at Kew for more than 20 years, and in 1893, Prof. Sargent introduced from North Japan the variety *Kaempferi* which blossoms well every year. Since then several other unnamed forms have proved equally hardy. A set of new Chinese species was received from Messrs. Veitch last year, but, protection having been afforded them, nothing definite can be said of their cold-resisting powers. Judging, however, from the plants in the open air in the Coombe Wood Nursery, it is late spring frosts rather than winter cold that have to be dreaded. *R. serpyllifolium*, a small Japanese species, has suffered badly, but *R. dilatatum* and *R. rhombicum* have flowered splendidly this spring. *R. Fordii* is much disfigured.

South American Plants.—It is interesting to find that the two species of Beech introduced from Chile by Mr. H. J. Elwes in 1902, viz., *Fagus antarctica* and *F. obliqua*, have been absolutely unaffected. Both are deciduous; but their naturally evergreen ally, *F. betuloides*, has lost all its foliage, and although not killed, is apparently unadapted for the open air at Kew. *Lomatia obliqua*, an evergreen shrub also introduced by Mr. Elwes in 1902, has withstood the cold very well in a recess of the wall of the Himalayan House. *Rhaphithamnus cyanocarpus* on a south wall is apparently killed, and *Schinus Bonplandianus* from Brazil is cut back to ground level. *Azara microphylla* is one of those shrubs

whose young branches are all killed, but it is breaking freely from the older wood. Of Fuchsias and Escallonias there is nothing unusual to record; all the former, and several of the latter, have been cut back to the ground even on walls, but as in former years will spring up again. *Buddleia globosa* is killed down to the old stems, but is rapidly recovering.

Californian Shrubs.—Of the tall-growing Ceanothuses, *C. thyrsiflorus* has proved the hardiest, although the large specimens, 15 feet or so high, which have made a remarkable feature for so long near the Broad Walk, are badly hit. They will, no doubt, quite recover. None of the species on the walls, such as *Veitchianus*, *rigidus*, *integerrimus*, etc., have been killed, but some have suffered. *Dendromecon rigidum* has perished even against a south wall. *Fremontia californica*, in one of the recesses of the outer wall of the Temperate House, is perfectly healthy and now in flower. *Umbellularia californica*, quite in the open, is untouched.

New Zealand Shrubs.—*Plagianthus Lyallii*, of which there was a fine bush 10 feet high in the collection of shrubby Malvaceae, was destroyed right to ground level, but against a wall it is untouched. The tenderness of this beautiful species is unfortunate; for several years past it has flowered profusely and late in the season, when few other shrubs are in blossom. *P. pulchellus* succumbed even against a wall. *Griselinia littoralis*, whilst it withstood the December frost apparently unaffected, was badly cut up by the biting winds of early March. It cannot be regarded as a dependable evergreen at Kew, in spite of all that has been said in its favour. *Sophora tetraptera* perished in the open, but not under the protection of a wall. The effects of the inclement winter on Veronicas—which constitute the most important group of New Zealand shrubs we can grow out-of-doors—have not been particularly marked, nothing like so disastrous as in 1895. About 10 species were killed or injured very severely, but as their susceptibility to cold is well known a set of cuttings is rooted each year and kept under protection in order that, if necessary, they may be renewed. An old plant of *Muehlenbeckia adpressa* was killed back to ground level.

Heaths.—These shrubs succeed well as a rule in Kew, and are much valued for producing broad masses of colour in spring and autumn. Apart from the British species, the hardiest of all have proved to be *Erica stricta* and *E. arborea* var. *alpina*, both of which remained fresh and green even to the smallest and youngest twigs. *E. mediterranea* is untouched except for the young succulent growths made late last autumn. *E. australis* is mostly killed to the ground; *E. lusitanica* and *E. arborea* were rendered very shabby; and *E. Veitchii* (a hybrid between the two latter) suffered more than either, probably because of its fast-growing habit. All the other species, native and exotic, that are mentioned in the Kew "Hand-list of Trees and Shrubs" were uninjured.

Cistuses, etc.—We have long regarded *Cistus laurifolius* as the hardiest species of this genus, and last winter confirms this view. The following have also survived:—*C. corbariensis*, *florentinus*, *lusitanicus*, *recognitus*, and *salvifolius*. *C. cyprius* is badly hit, but

is now breaking freely from the base. These species are evidently the most desirable members of this beautiful genus to grow where no protection can be afforded. Of Helianthemums, *H. alyssoides*, *formosum*, *ocymoides*, and *vineale* have survived, but *H. halimifolium* is nearly swept away and *H. umbellatum* has almost disappeared.

An interesting—and to me unexpected—result is the passing through the winter of *Magnolia Campbellii* quite uninjured. Plants were killed in 1895. Two Madeiran shrubs, *Genista virgata* and *Vaccinium padifolium* (*V. maderense*), are grown in the open air here. The former is so hardy as to be naturalising itself about the grounds, and a plant of the latter has grown just inside the Main Entrance for at least 65 years. Sir Joseph Hooker believes it to be the original plant introduced by Francis Masson on his return from South Africa in 1777.

The exceedingly rare *Elliottia racemosa*, of which there are two plants at Kew, has not been affected in the least, although a native of Georgia. *Diospyros Kaki*, uninjured on a wall, succumbed in the open.

In a general way old and well-established shrubs with stout woody stems withstand a severe winter better than younger and more succulent ones. But there are curious exceptions. For instance, all our old specimens of *Veronica Traversii* have been crippled beyond recovery, but young two- or three-year-old plants are scarcely touched. And the only plants of common Rosemary remaining after the winter are plants two years old; all the older ones having perished. A similar result was noted at Kew in 1895 in regard to *Daböecia polifolia*, young plants surviving when old ones were destroyed.

Raphiolepis ovata, usually confined in greenhouses, is in perfect vigour in spite of the trying winter. *Choisya ternata*, remarkable in being a Mexican shrub, hardy near London (perhaps the only one), was rendered rather shabby in foliage, but flowered excellently in May.

Evergreens.—A curious feature of the winter has been the number of habitually evergreen trees and shrubs which lost all, or nearly all, their leaves, but were not otherwise injured. The most striking instance at Kew is furnished by the Holm Oak (*Quercus Ilex*). Many trees—but far from all—were quite defoliated. *Osmanthus Aquifolium* dropped all its leaves, whilst its reputed variety *ilicifolium* retained them. Of the newer Chinese shrubs *Cotoneaster angustifolia* and *Rhododendron yunnanense*, both evergreen in ordinary seasons, were this year deciduous. An old and well-known denizen of gardens, *Berberis Wallichiana* became quite bare after the December frost, together with its several varieties except two. One of these, a native of China, sent to Kew by M. Maurice de Vilmorin, is a charming shrub of low, dense, rigid growth, with leaves vividly white beneath; it is quite unharmed. The other, also Chinese but introduced by Wilson, is similar to the ordinary Himalayan type in habit; it also retained its leaves. Many Deodars were almost devoid of foliage by the middle of March, and the Phillyreas (except *P. decora*) were scarcely recognizable in their almost leafless condition.

One rather striking accompaniment to the denudation of these evergreen trees and shrubs was the uplifting of the branches after they had been relieved of their normal weight of foliage. Many of them which ordinarily rest on the ground rose one or two feet from it, and the ends became incurved like the eaves of a Chinese temple, giving the trees a curiously unfamiliar pose.

XXXI.—NOTES ON NEW ZEALAND MARINE ALGAE.

A. D. Cotton.

A number of New Zealand algae have been from time to time examined and identified in the Herbarium, and in the course of their determination several points of interest have come to light. The publication of these will doubtless be of value to students in that country, and in the following notes the results of some recent investigations are given.

Myrionema strangulans, *Grev.*, Scotch Crypt. Flora, vol. v. Pl. 300 (1827). On *Ulva latissima*, D.C., Otago, *Lyall*, March 1850. On *U. rigida*, Ag., West Coast, Algae Muellerianae.

Not previously known from New Zealand. The specimens agree precisely with those found in Europe on the same host.

Leathesia difformis, *Aresch.*, and **Petrospongium Berkeleyi**, *Naeg.*

In the Flora of New Zealand, Harvey does not include *Leathesia difformis*, Aresch., though he refers to *L. Berkeleyi*, Harv. (= *Petrospongium Berkeleyi*, Naeg.) and *Asperococcus sinuosus*, Bory (= *Colpomenia sinuosa*, Derbes & Sol.). The Lyall gathering of the latter at Kew is found, however, to consist of *Leathesia difformis*. As far as can be seen, the specimens differ in no way from the European examples.

The record of *P. Berkeleyi*, Naeg., is founded upon specimens sent by Colenso. The plant has not since been collected in New Zealand, and Laing suggests that Colenso's plant may possibly be referable to *Leathesia difformis*. An examination of the original gathering shows that this is not the case. The type of structure is the same as that of *P. Berkeleyi* of Europe, but the filaments are more slender than in that species. It is probable that the New Zealand plant is specifically distinct from that of Europe, but further material is necessary before a definite statement can be made. Colenso notes that the plant occurred "on tidal rocks near Cape Kidnapper."

Dictyota ocellata, *J. Ag.*, Anal. Algol. cont. 1, p. 68 (1894); Laing, Revised List, Addendum to Part 1, in Trans. & Proc. N.Z. Instit. vol. xxxiv., p. 358 (1901); *see also* vol. xxxii., p. 65 (1899).

It is well known that whilst some 10 or 12 species of *Dictyota* occur in South Australia, only two species have been recorded from New Zealand. Some of the New Zealand records have since been referred to other genera, others again have been questioned, so that Laing in his "Revised List of New Zealand Seaweeds," 1899, p. 65, remarked: "Indeed I am by no means certain that we have in New Zealand any species of *Dictyota*, as it is quite possible

that immature specimens of *Glossophora Harveyi* have been confused with *D. dichotoma*." In 1901 he recorded, however, *D. ocellata* on the authority of J. Agardh.

The presence of a fragment of a true *Dictyota* in a collection of Algae from the Chatham Islands, and also of several New Zealand specimens referred to that genus in the Kew Herbarium, suggested the desirability of an examination of the material available. The result of this examination is given below, from which it will be seen that two, if not three, species are found to be represented in the Kew Herbarium, though at the same time Laing's opinion with regard to *Glossophora* was found to be correct.

Dictyota dichotoma is mentioned by Harvey in the Flora New Zealand as collected by Lyall and Colenso. Lyall's specimens (dredged in 8 fathoms, Queen Charlotte Sound, Nov., 1850) represent a fine large plant with broad segments which branch in a subregular dichotomous manner. The structure is that of a typical *Dictyota*, but the fronds are unfortunately sterile. The plant does not appear to agree with any of the known broad-fronded Australian species, and it probably represents an undescribed species. Colenso's gathering (Hawke's Bay) consist of two species, one is *Dictyota ocellata*, J. Ag., and the other possesses the three-layered frond of a *Glossophora*, and doubtless represents young plants of *G. Harveyi*, J. Ag.

In the Hooker collections in the Herbarium there are specimens collected by Sinclair (Bay of Islands, Sept., 1841). The plants are too fragmentary for a definite opinion to be expressed, but from the disposition of the tetraspores the species is evidently closely allied to the European *D. dichotoma*, if indeed it is not identical with it.

Callophyllis Hombroniana, *Kütz.*, Spec. Alg., p. 746, pro parte (1849). *Rhodymenia Hombroniana*, Mont., Prod., p. 3 (1842); Voy. Pol. Sud., p. 157, tab. 1, fig. 2 (1842–5); non *Callophyllis Hombroniana*, Kütz. in Harv. et Hook. Crypt. Antarct., nec in Flora New Zealand. *Callophyllis erosa*, Harv. Fl. New Zeal., vol. ii., p. 250 pro parte, Pl. 118, fig. 1, 3, 4 (1855).

In New Zealand some uncertainty exists as to the identity of *Callophyllis Hombroniana*. Montague's beautiful figure (Voy. Pol. Sud. l.c.) gives an excellent idea of the plant, and the large number of specimens that exist in British herbaria indicate that the species is of common occurrence. Harvey's conception of the plant was incorrect, he having confused it with another species, *C. callibleph-aroides*, J. Ag., an error pointed out by J. Agardh (Epic, p. 231). Harvey, however, as explained below, figures it well in the Flora of New Zealand.

It has been already pointed out in the Kew Bulletin (1908, p. 102) that the original gathering of *Callophyllis erosa* consisted of more than one species, a fact which explains the character of the published figure and description. Figure 2 of Pl. 118 in the Flora of New Zealand has long been known to represent *Craspedocarpus erosus*, Schmitz (= *Rhodophyllis erosus*, J. Ag.), whilst the remaining figures have been either left as depicting *Callophyllis erosa*, Harv., or referred to *C. Hombroniana*. Considerable uncertainty, however, exists, and De Toni omits all reference to the figures. From an

examination of the specimens it is perfectly clear that *Callophyllis erosa* cannot exist as a species, part of the original gathering being composed of *Craspedocarpus erosus*, Schmitz, and the remainder (with the exception of an indeterminable fragment) of *C. Hombroniana*. The specimen depicted in figure 1 is in the Kew Herbarium, and is a typical, though somewhat worn, example of the last named plant, and figures 3 and 4 refer also to the same species.

The following is a revised description of *C. Hombroniana* :— Fronds narrow, much branched, rather large, deep crimson. Root small, discoid. Main branches 5–8 mm. wide, erect or spreading 20–25 cm. long, irregularly dichotomous, and pinnately beset with branched laciniae, or lateral branches. Lateral branches short, repeatedly and irregularly dichotomous ; margins laciniate. Laciniae short, almost simple or much branched. Cystocarps single in the segments of simple or slightly branched laciniae. Tetrasporangia in terminal segments of lateral branches and in densely branched laciniae, cruciately divided, 40 × 20μ.

Distinguished from *C. calliblepharoides* by the longer narrower fronds and much branched laciniae. The Tasmanian *C. Lambertii*, Harv. which *C. Hombroniana* most closely resembles differs in the ancipate frond, coarser and thicker lateral branches and absence of fimbriae ; whilst *C. coccinea* may be known by the much narrower branches, absence of fimbriae and by the long dichotomously branched lateral branches.

Chrysymenia asperata, *Cotton*, comb. nov.

Callophyllis asperata, Harv. in Hook., Flora New Zealand, vol. ii., p. 250 (1855). *Chrysymenia? apiculifera*, J. Ag., Epic. p. 320 excl. syn. (1876).

Callophyllis asperata, Harv., is little known and has not been lately recorded. An examination of the type specimens in the Herbarium shows that the plant is not a *Callophyllis*, but possesses the texture and structure of *Chrysymenia* ; a striking resemblance was also noted to J. Agardh's New Zealand *Chrysymenia apiculifera*. On comparing it with the original gathering of the latter (part of which is in the Herbarium) the two plants were found to be identical. An alteration of name is therefore necessary.

The tetraspores of the present species are cruciately divided, and there is little doubt that the generic position accorded to it by Agardh is correct, though his ideas were somewhat confused owing to his uniting it with *Nitophyllum variolosum*, Harv. The latter, as stated below, is a true *Nitophyllum*.

Nitophyllum variolosum, *Harv.* in Flora New Zealand, vol. ii., p. 241 (1855).

Clearly described by Harvey in the Flora of New Zealand, this alga was linked by J. Agardh (Epic. p. 320) with his *Chrysymenia apiculifera*. Agardh had not seen authentic specimens, but stated that such a common alga as *C. apiculifera* could not have been unknown to Harvey, and that the plant named *N. variolosum*, with peculiar root-like processes, was probably the same as his *C. apiculifera*. Consequently *N. variolosum* has disappeared from the list of *Nitophylla* and now figures only as a synonym of *C. apiculifera*.

Two of the original specimens collected by Lyall are preserved at Kew, and they clearly show that on this occasion Agardh was in error and that the plant is a *Nitophyllum*.

Though nearly allied to *N. palmata*, the present plant appears to be distinct from any of the species described in that difficult section. The root-like processes, with which both the surface and margin of the frond are beset, give the plant a peculiar appearance, but as these bodies are not always present this character must be used with care. In Britain similar outgrowths are met with upon certain forms of *N. laceratum*, especially those in which procumbent fronds are present, or those in which the fronds are in contact with other algae. The stimulus of contact appears in this species to be capable of bringing about the production of these peculiar attachment organs. From the appearance of the Kew specimens of *N. variolosum* it seems very probable that the same cause might occasion the formation of root-like processes in that species. Harvey's diagnosis precisely describes the Kew specimens and nothing of material importance can be added to it.

As surmised by Agardh, *C. apiculifera* was not unknown to Harvey, but he regarded it as a *Callophyllis*, having named it, as shown above, *C. asperata*. The ciliate processes on that plant bear no resemblance to those on the *Nitophyllum*, but are densely scattered over both surfaces of the fronds and have not the slightest appearance of being organs of attachment.

Nitophyllum uncinatum, *J. Ag.*, Species Alg., vol. ii., p. 654 (1852).

Nitophyllum uncinatum is a very distinct species, but it is one which has become obscured owing to the fact that uncinate branches may be also produced by other species of the genus.

The plant was first described by J. Agardh in 1852. He states that it is not uncommon in the Mediterranean, and was characterised by the possession of acuminate fronds and of occasional uncinate branches; the sori moreover were produced immediately behind the apex of special short branches. Unfortunately, Agardh quoted as a synonym *N. laceratum* var. *uncinatum*, Grev. The latter is a perfectly distinct plant, but the error has been perpetuated. *N. laceratum*, Grev. assumes a large number of forms and the variety *uncinatum*, Grev., is not at all uncommon in the south of England. In the tetrasporic condition there is no difficulty in separating it from Agardh's species, and even when sterile, the straggling habit, the dingy colour, the blunt apices of the frond and well-marked veins are usually sufficient to distinguish it. In Britain *N. uncinatum*, J. Ag., is very rare and *N. laceratum* var. *uncinatum*, Grev., is not uncommon, whilst in the Mediterranean the reverse is the case.

When an examination is made of the Australian and New Zealand specimens of *Nitophylla* a similar state of affairs is found to exist, two distinct species having been referred to *N. uncinatum*, J. Ag. One is a plant which with little doubt is Agardh's species, and the other is an uncinate form of *N. multipartitum* H. and H. The former agrees in form and structure with the European specimens, but up till the present it has only been examined in a sterile state.

With regard to New Zealand, the uncinate form of *N. multipartitum* has not been observed, but *N. uncinatum*, J. Ag., is represented by several specimens.

It may also be mentioned that several seasons' study of the genus *Nitophyllum* on the English coasts has clearly demonstrated that remarkable diversity in form can be exhibited by certain species, *e.g.*, *N. punctatum* and *N. Gmelini*, though the structural characters remain unchanged. The precise conditions that bring about a given form have not yet been satisfactorily determined, but the depth of water and the amount of light are doubtless two very important factors. It is interesting to note that the variations which occur in the European species referred to, are closely paralleled by the Australian species *N. crispum* and *N. affine*. Such observations strengthen the view that not a few of the so-called species from Australia are in reality only forms.

Aphanocladia delicatula, *Falkenb.*, in Engl. and Prantl. Pflanzenfam., p. 444 (1897); *Rhodomelaceen*, p. 288, tab. 2, figs. 15–17 (1901). *Rytiphloea delicatula*, Harv. in Hook. Flora New Zealand, p. 224, pl. 112 D (1855); Laing Rev. List, p. 355 (1901).

A fine tuft of this rare species was forwarded to Kew by Mr. R. H. A. Shakespear from Little Barrier Island. The gathering is interesting, not only as coming from a northern locality, but also that, according to Laing, the plant has not been collected since Lyall's time. The Little Barrier Island plants agree in every way with Lyall's original specimens.

Falkenberg removed the present species from *Rytiphloea* to a special genus *Aphanocladia*. The latter he placed amongst the *Pterosiphoniae*, a sub-family distinguished from the *Polysiphoniae* mainly by the distichous branching. The new position is decidedly more natural. *Aphanocladia* differs from *Pterosiphonia* in possessing only four pericentral cells, and by the spiral arrangement of the tetrasporangia.

With the exception of a record by Reinbold from New South Wales, *A. delicatula*, Falkenb., is only known from New Zealand.

XXXII.—ADDITIONS TO THE WILD FAUNA AND FLORA OF THE ROYAL BOTANIC GARDENS, KEW: IX.

NEMATODA.

Aphelenchus olesistus, *Ritzema Bos*; an eelworm in fern fronds.

Quite recently, conspicuous, well-defined, brown stripes or irregularly shaped blotches, were observed on the fronds of various species of ferns growing under glass. Microscopic examination revealed the presence of eelworms in the diseased patches, which Dr. J. G. De Man, Terseke, Holland, kindly examined and identified as *Aphelenchus olesistus*, Ritzema Bos. This species also causes brown patches on the leaves of species of *Begonia*, *Chrysanthemum*, *Gloxinia*, *Coleus*, *Saintpaulia*, etc.

Dr. Ritzema Bos states that when the air is moist the eelworms migrate from old diseased parts and enter other healthy portions of the frond or leaf, through the stomata, and that when diseased plants are placed in fairly dry air, such migration cannot take place. He further states that dusting the plants with a mixture of tobacco powder and sulphur is an excellent remedy.

The eelworm has attacked *Aneimia collina*, Raddi, *Pteris Droogmantiana*, L. Linden, *Adiantum capillus-veneris*, L., and *Lygodium volubile*, Sw., amongst others, at Kew.

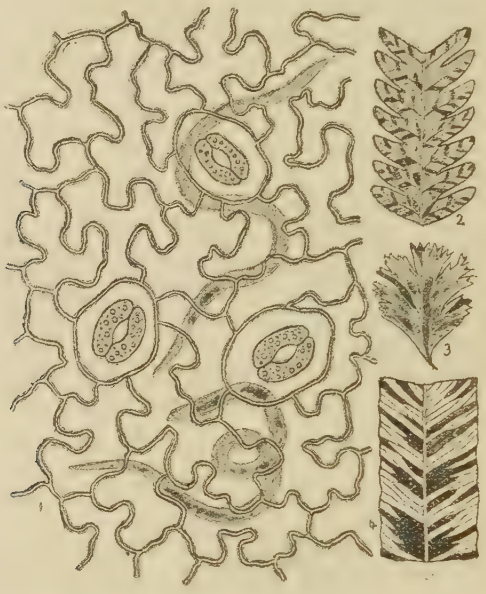

Fig. 1. *Aneimia collina*, Raddi, showing the eelworms in the tissue of the frond under the epidermis × 300.
Fig. 2. *Pteris Droogmantiana*, L. Linden. The dark streaks are caused by the eelworm.
Fig. 3. *Adiantum capillus-veneris*, f. *fissa*, showing dark patches due to eelworm.
Fig. 4. *Lygodium volubile*, Sw., with dark streaks caused by eelworm.

TERRESTRIAL ISOPOD CRUSTACEA.

Richard S. Bagnall.

Five species of woodlice have already been recorded from the Royal Botanic Gardens, Kew, namely, *Trichoniscus roseus*, *Oniscus asellus*, *Porcellio scaber*, *Philoscia muscorum*, and *Armadillidium vulgaris*, but to make the following list as complete as possible these forms have been included.

On December 2nd, 1907, the writer and Mr. H. St. J. K. Donisthorpe spent an hour in the propagating pits in search of ants, beetles, woodlice, etc., and as the results were so satisfactory, returned and collected for the greater part of the following day. Eighteen species of woodlice were obtained and noted, two of which have been described as new, whilst three others await identification. Four of the five species already recorded were more or less plentiful, but *Armadillidium vulgaris* was not met with.

In the following list the references of *Trichoniscus stebbingi*, Patience ; *T. linearis*, Patience ; *T. pygmaeus*, Sars, and *Philoscia patiencei*, Bagnall, are given, as those species are amongst the number of those that have been met with since the publication of Webb & Sillem's " British Woodlice " in 1906.

ISOPODA.

Trichoniscidae.

Trichoniscus pusillus, *Brandt.*

T. roseus, *Koch.*
In several of the houses and pits, and occasionally in the open.

T. stebbingi, *Patience, Journ. Linn. Soc. (Zool.)*, xxx., pp. 42–44, pl. 7, 1907 ; Bagnall, *Ann. de la Soc. Royale Zool. et Malacol. Belg.*, xliii., pp. 127–129, 1908, and *The Irish Naturalist*, Feb., 1909, pp. 42–44.
Numerous specimens, mostly found at the roots of plants in the hotter propagating pits.

T. linearis, *Patience, Ann. & Mag. of Natural History*, Ser. 8, vol. i., pp. 280–282, pl. xi., March, 1908.
Described from two specimens, ♂ & ♀, found with *Haplophthalmus daniscus* in one of the cooler houses. *T. linearis* bears a strong superficial resemblance to a small *Haplophthalmus*, both in its appearance and movements.

T. pygmaeus, *G. O. Sars, Crustacea of Norway*, ii., p. 162, pl. lxxii., fig. 2, 1897 ; Bagnall, *Ann. & Mag. of Natural History*, Ser. 7, xviii., p. 474, Dec., 1906 ; *Ann. de la Soc. Royale Zool. et Malacol. Belg.*, xlii., pp. 263–266, 1907, and *The Irish Naturalist*, p. 43, Feb., 1909.
Not uncommon in the cooler houses and in the open gardens. Evidently widely distributed in the British Isles.

Trichoniscoides albidus, *Budde-Lund.*
Rare ; three or four specimens from under a board in a cool frame.

Haplophthalmus mengii, *Zaddach.*
A single specimen in one of the propagating houses, Dec. 2nd, 1907.

H. danicus, *Budde-Lund.*
Several in one of the cooler propagating houses, and numerous specimens collected by the late Mr. George Nicholson in the spring of 1908, found under a board lying in the open gardens.

Oniscidae.

Oniscus asellus, *L.*

Philoscia muscorum, *Scopoli.*

Philoscia sp.
A large species of *Philoscia* occurs plentifully deep down in the wet shingle, in the Palm, Fern, and Economic Houses.

P. patiencei, *Bagnall, Ann. & Mag. of Natural History*, Ser. 8, i., pp. 428–431, pl. xviii., May, 1908.

A small species described from specimens found in one of the hottest propagating houses, where it occurs in large numbers amongst the ooze formed beneath a layer of earth and ashes. The species bears a strong superficial to *Trichoniscus pusillus*.

Bathytropa sp.

Several specimens found with a yellow ant, *Wasmannia auropunctata*, in the same propagating house as the above species (*Philoscia patiencei*).

Porcellio scaber, *Latr.*

Porcellio dilatatus, *Brandt*. Not uncommon in most of the pits, and in a heap of vegetable refuse in the open.

Porcellio, sp. A single specimen collected by Mr. Donisthorpe, and probably referable to *Nagurus cristatus*, B.L.

Metoponorthus pruinosus, *Brandt*. This pretty species is not at all uncommon in the cooler houses as well as in the open. In Trop. Fern House; Coll., E. W. Morse.

Armadillidiidae.

Armadillidium vulgare, *L.* Recorded by Mr. Scourfield.

A. nasatum, *B.–L.* Common amongst shingle and at the roots of plants in the Palm and Economic houses, and also in most of the propagating pits.

ARACHNIDA.

Rev. O. Pickard-Cambridge, M.A., F.R.S., &c.

Since the publication of the List of Arachnida found in the Royal Botanic Gardens, Kew (*Kew Bulletin, Additional Series*, V., "Wild fauna and flora of the Royal Botanic Gardens, Kew," 1906, p. 53), I have received some materials from the late Mr. George Nicholson, and more recently from the Assistant Director and others; and, I have much pleasure in recording the additions thus made to this portion of the Gardens' fauna.

It will be seen that these additions are not numerous, and are for the most part, exotic or foreign forms, which have no doubt been introduced in packages of plants or other materials. Some of the foreign forms found in the Gardens are, however, of much interest as being more or less permanently naturalized in the various hothouses and greenhouses, though their interest is considerably lessened by the difficulty and uncertainty as to whence they may have been originally imported. To these additions I have subjoined two or three corrections of synonyms and nomenclature of the former list.

ARANEIDEA.

(British Species.)

Pholcidae.

Pholcus phalangioides, *Fuess.* In propagating pits. Coll., H. Ruck. Probably this spider was originally an exotic importation into England, but it may well have existed at Kew before such importations took place there. It is found in great abundance in various localities in the south of England, but generally, if not always in outhouses, old unused lofts and buildings, and in old wood stacks.

Theridiidae.

Robertus lividus, *Blackw.* An abundant species among the débris of old hedges, dead leaves and such like, and widely distributed—a single example from the late Mr. Nicholson.

Entelecara acuminata, *Wider.* A local and rather rare species. Two examples from Mr. Nicholson.

Eperiidae.

Tetragnatha extensa, *Linn.* In Tropical Fern Houses. Coll., E. W. Morse. An adult female of rather unusual size and distinctness of markings. In Fern pits, April 24, 1909. An abundant British spider, but not previously recorded in the Royal Gardens, Kew.

Meda Menardi, *Latr.* In an old decayed elm, Q. Coll., W. Dallimore. A widely distributed but local spider, found in shady, damp places.

Lycosidae.

Pirata hygrophilus, *Thorn.* A single female found in propagating pits. Coll., H. Ruck. A local species usually found on the borders of streams and in swamps among water weeds.

Rectification of Synonyms, &c.

Theridiidae.

Micronetа viaria, *Blackw.* (*Kew Bull.* Addl. Ser., V., p. 58.)
Syn.: *Micronetа Nicholsonii*, Camb. (*K. B.* Addl. Ser. V., p. 58.)
An examination recently of a large number of examples of *M. viaria*, Blackw., convinces me that *M. Nicholsonii* is only an abnormal variety of it.

Drassidae.

Drassus lapidosus, *Walck.* (*K. B.*, Addl. Ser. V., p. 54.)
Syn.: *Drassus macer*, Thor.-Camb. (*K. B.* Addl. Ser. V., p. 56.)
Syn.: *Drassus cupreus*, Blackw. (*id.*)
The result of much consideration and examination, both of British and foreign examples, is to convince me of the identity of these three species.

Salticidae.

Panysinus Nicholsonii, *Cambr.*
Syn. : *Hasarius Nicholsonii*, Cambr. (*K.B.*, Addl. Ser. V., p. 63.)
The genus to which this fine showy spider is now relegated is *Panysinus*, Simon. (Histoire Naturelle des Araignees, 2, p. 802.)

ARANEIDEA.

(*Exotic Species.*)

Oonopidae.

Ischnothyreus velox, *Jackson*, *Trans. Nat. Hist. Soc. Northumberland, Durham, and Newcastle-upon-Tyne*, n.s., Vol. 3, Part 1, p. 5 ; *see* on pages 9–13, 1908.
This spider was first found in a Kew hothouse in 1907 by Mr. Bagnall, who sent them to Dr. A. R. Jackson. Examples were subsequently found there and sent to me by Mr. H. Donisthorpe. (Proc. Dorset. N.H. & A.F. Club, XXIX., p. 165, Pl. A, figs. 1–6.)
Dr. Jackson had previously received the same species from a hothouse at Alnwick (Northumberland) and had himself found it in warm greenhouses in the Nursery Gardens at Chester.

Diblemma Donisthorpii, *Cambr.*, *Proc. Dorset. & A.F. Club*, 1908, Vol. XXIX., p. 188, Pl. A, figs. 7–13.
Both sexes of this spider were found, and sent to me by Mr. Horace Donisthorpe, in February, 1908. They were discovered in a hothouse among cinders beneath flower pots on the floor, in company with a minute West Indian ant (*Wasmannia auropunctata*, Roger, *see* Fig. 7 of the plate). Both the genus and species were new to science (*see* Fig. 5).

Urocteoidae.

Subgen. Œcobiinae.

Œcobius navus, *Blackw.* (♀ ad.)
An example of this curious little spider was sent to me from the Royal Botanic Gardens, Kew (accompanied by two others, a *Laseola* and a *Lathys*), by Mr. H. Donisthorpe, with the following cue to their probable origin : "Caught on a bundle of imported cork probably from Spain or N. Africa." I had, before receiving this cue, conjectured the *Œcobius* to be Mr. Blackwall's species, whose habitat is Madeira, and this is now made certain by finding in my collection Mr. Blackwall's type specimens.

Dictynidae.

Lathys (Lethia) lepida, *Cambr.* (sp. n. ♀ ad.).
Length 1 line. *Cephalothorax* of normal form, pale greenish-brown, with a dark blackish marginal line and marked with converging dark brown lines, also a largish triangular patch of a similar colour at the junction of the caput and thorax, the anterior angle drawn out into a fine line ending between the hind central pair of eyes. The eyes are rather large and, excepting the fore-central

pair which are much smallest, all of a pearly-white colour ; the curve of the hinder row has its convexity directed backwards, and its eyes are almost equally separated by a diameter's distance, the hind-centrals being rather nearer together than each is to the lateral eye on its side. The anterior row is shortest ; it is curved, but much less so, in the same direction as the hinder row, and its eyes are very near together ; those of each lateral pair are placed obliquely and are almost contiguous to each other. *Falces* strong, straight, perpendicular, and of moderate length. *Legs* short, moderately strong, and not very different in length ; similar to the cephalo-thorax in colour, annulated with dark brown, and furnished with coarse bristly hairs. On each of the metatarsi of the posterior pair there is on the hinder side a thin but very distinct calamistrum. The other characters of the fore-part of the spider are normal, and the general colour is like that of the cephalo-thorax. The height of the clypeus is less than the diameter of a fore-central eye.

The *abdomen* is oval, somewhat roundly truncate before, of a black-brown colour above and on the sides, minutely speckled with pale spots (probably not visible except through spirit of wine) rather darkest along the median line ; there are two indistinct whitish spots in a transverse line at its fore extremity, from which at about a third of its length is a longitudinal series of four distinct angular white lines, or chevrons, the two middle ones of these are connected at their bases with another short line, forming another angle to each line ; some little variation in this would be probably found in a series of examples. A large portion of the underside is suffused or marbled with white. The genital aperture is very distinct and characteristic in its form. The whole abdomen is furnished with hairs, and just in front of the normal spinners, which are rather short, is the cribellum placed transversely and not very conspicuous.

A single example found with *Œcobius navus*, and the following spider (*Laseola*) in the same package of cork, and probably imported with them from Spain. It is a very distinct little species and is nearly allied to, but I think quite distinct from, *Lathys* (*Cinifio*) *affinis*, Blackw. (Madeira).

Fam. ; Theridiidae.

Laseola lugens, *Cambr.*, sp. n.

Adult female length 1½ lines. *Cephalothorax* deep brown, caput paler, prominent in the ocular region and furnished with a few long bristly hairs. *Abdomen* large, broad-oval, a little pointed at the spinners and projecting greatly over the base of the thorax ; colour jet black, glossy, thinly clothed with long coarse hairs and spinelike bristles. *Legs* rather short, slender, not greatly different in length, 4, 1, 2, 3 ; femora black ; genuae and tibiae red-brown, with the anterior portion paler ; tarsi and metatarsi black ; the exinguinal joint of each of the fourth pair, with a portion of the base of the femur, is white and presents, I think, a very distinct character of the species ; the tibiae of the fourth pair are of a darker hue than the others. The legs are furnished with coarse hairs and slender spinelike bristles. The eyes of both rows are

strongly curved, the convexity of the curves of both directed forwards ; those of the hinder row are about equal in size and nearly equidistant from each other, the interval being equal to or rather more than an eye's diameter. The four centrals form nearly a square whose posterior is longer than the other sides.

A single example was found in company with the *Œcobius* and *Lathys* above described, and I have a female of it from Lisbon. It appears to me a very distinct species, and on the whole I should be inclined to think that most probably all three species were imported from Spain, as before suggested.

PHALANGIDEA.

Gonyleptidae.

Two examples, which may be of different species or possibly the two sexes of the same species, were received in February, 1909, from Propagating Pits. Coll., H. Ruck. These are still under examination.

THELYPHONIDEA.

Order Thelyphonides.

Tartaridae.

Trithyreus Bagnallii, *Jackson, Trans. Nat. Hist. Soc. Northumberland, Durham, and Newcastle-on-Tyne*, n.s., Vol. 3, Part 1, pp. 28–30, and Part 2, p. 23, Pl. X., figs. 1–5.

♀. Examples of this curious little Arachnid were sent by Mr. Bagnall to Dr. A. R. Jackson in December, 1907, from a hothouse at Kew, and subsequently I received examples from the same locality from Mr. H. Donisthorpe. The family Tartaridae was based by myself many years ago upon examples from Ceylon to which I gave the generic name of *Nyctalops*. The group has since been more thoroughly worked at by the late Dr. Thorell, Prof. H. J. Hansen (Copenhagen), and others, but little is really known about it. (*Cf.* O.P.-Cambridge in Proc. Dors. N.H. & A.F. Club, XXIX., p. 185, 1908.)

ACARIDEA.

Gamasidae.

Gamasus crassipes, *Hermann*. In Herbaceous Ground frames. Coll., W. Irving.

Identified by Mr. Nigel Pearce, of Trinity College, Cambridge. This may have been of foreign importation, but the species is known as British.

HYMENOPTERA.

Formicidae (Ants).

H. St. J. Donisthorpe.

The following species of ants have not been recorded from Kew :—

Prenolepis bruneri, *Mayr.*, sub sp. **Donisthorpei**, *Forel.* (Fig. 6.) This new sub species was recorded in error in my last list (*K.B.* 1908, p. 122) as *P. caeciliae*, Forel. Prof. Forel has now described

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it as above (Bull. Soc. Vaud. Sc. Nat. xliv. 1908, p. 64). It still occurs in the Fern and Palm Houses, and I found it this year in the Lily House. *See* Fig. 6 of the plate.

Prenolepis steinheili, *Forel*, var. minuta, *Forel*. Found among Palms from British Guiana by H. Green. A native of the Antilles.

Brachymyrmex patagonicus, *Mayr*. Numerous in the Orchid Houses.

Monomorium minutum, *Mayr*. I discovered this very small species on one plant in the Propagating Pits. It has also been taken this year in the Fern Pits by J. S. Christie.

Camponotus (Colobopsis) truncatus, *Spinola*. (Figs. 1 and 2.) The discovery of this species is of considerable interest. J. S. Christie found *Cremastogaster scutellaris* on some "virgin" cork in the Fern Houses, and bottled, as he thought, four specimens, which were sent on to me. One of the four turned out to be a beetle *Formicomus pedestris*, Rossi! (*See* Fig. 3.) Though very "ant-like" in appearance, it is not a very good mimic of the *Cremastogaster*. I went down to try and get more. I was not successful in this, but I found another species of ant (the *Camponotus*) in some numbers in the cork. The beetle is extremely like this ant in colour, even having the two yellow spots on its black elytra, which are situated on the black abdomen of the ant; moreover, the segments of the ant's abdomen appear to be represented on the elytra of the beetle by white hairs, and the head and thorax of both are red. (*Cf.* Fig. 2, Fig. 1.) The beetle (Fig. 3) is also the same size as small ♀.♀ of the ant. Large ♀ ♀ occurred with very large square heads. Prof. Forel tells me that there are many mimics among the ants of this genus. Also that *Colobopsis* itself, as well as *Camponotus lateralis*, are held to be mimics of *Cremastogaster scutellaris*. The species is abundant in Algeria.

I also found a Psoccus in some numbers in the cork with the ants which Mr. Guermonprez has named for me *Lepinotus inquilinus*, Heyd, and remarks that it is very likely the natural home of this species is in the nests of insects.

Of other Myrmecophiles I may mention that Mr. Bagnall and I saw a specimen of the little Orthopteron (*Myrmecophila prenolepidis*, Wasm. ?) among the ants of a colony of *Prenolepis longicornis*, Ltr., in the Propagating Pits, but it escaped, as it can jump very strongly.

Mr. Cambridge has described a little spider (Fig. 5) (*Diblemma Donisthorpei*, Camb. Proc. Dorset. Nat. Hist. & A.F. Club, 1908, p. 188) which I discovered with the little ant (Fig. 7) *Wasmannia auropunctata*, Roger, in the Propagating Pits last year. It was a new genus and species, and occurred in some numbers with the ants, to which it bears a strong superficial resemblance.

Technomyrmex albipes, *Smith*. (Fig. 4.) The ergatoid ♂ ♂ of this ant, mentioned in my last list, have since been described by Prof. Forel (Bull. Soc. Vaud. Sc. Nat. 1908, p. 2). I took a ♀ of this species in the Palm House, 11, ii., 09, the first I have seen.

The ordinary ♂ is figured (*see* plate, Fig. 8, as also the little ant (Fig. 9), *Strumigenys rogeri*, Em., of my last list.

Chalcididae.

Coccophagus flavoscutellum, *Ashmead*, and Encyntus sp.? Several specimens taken in Fern House. These little Hymenopterous insects are parasitic on the Coccid *Lecanium oleae*, Brn.

Ichneumonidae.

Triclistus holmgreni. ♀. Taken by H. Ruck in the Propagating Pits ; named by Mr. Claude Morley.

COLEOPTERA.

W. E. Sharp.

(*British species.*)

Clavicornia.

Tachinus rufipes, *de G.* In Propagating Pits. Coll., H. Ruck. Common everywhere.

Silvanus surinamensis, *L.* In Propagating Pits. Coll., H. Ruck. A cosmopolitan species found in all kinds of imported produce. Can hardly be considered a member of the British fauna in its strictest sense.

Corticaria pubescens, *Gyll.* In Propagating Pits. Coll., H. Ruck. A not uncommon British species.

Palpicornia.

Sphaeridium scaraboeoides, *F.* In Propagating Pits. Coll., J. Scott. Generally common in the dung of herbivorous animals.

Lamellicornia.

Dorcus parallelopipedus, *L.* In an old decayed Elm Tree, Q. Coll., W. Dallimore. In the larval state this insect usually feeds in decayed ash trees.

Aphodius fimitarius, *L.* In Propagating Pits. Coll., H. Ruck.

Aphodius punctato-sulcatus, *Sturm.* Herbaceous ground. Coll., W. Irving.

Two very common species of "dung beetles."

Serricornia.

Melanotus rufipes, *Herbst.* In Fern Houses. Coll., J. S. Christie.

Athous hoemorrhoidalis, *F.* In Aroid House. Coll., H. Green. In Propagating Pits. Coll., H. Ruck.

A common British "skip-jack" beetle.

Agriotes lineatus, *L.* In Propagating Pits. Coll., H. Ruck.

Dolopius marginatus, *L.* In Propagating Pits. Coll., J. Scott.

The above four beetles are common British species, but owing probably to the temperature of the houses at Kew, have appeared in imaginal form long before their normal period of emergence.

Telephorus rusticus, *Fall.* In Palm House. Coll. J. W. Anderson. A common species on Umbelliferae.

Heteromera.

Nacerdes melanura, *L.* Herbaceous ground. Coll., W. Irving. Breeds in old damp woodwork; often found in cellars and the streets of towns.

Rhyncophora.

Sitones sulcifrons, *Thumb.* In Herbaceous ground. Coll., W. Irving.

Coeliodes erythroleucus, *Gmel.* In Propagating Pits. Coll, H. Ruck.

Both species occur on *Ulex* in early spring, the former commonly, the latter very occasionally.

Cucujidae.

Cathartus advena, *Wal.*, with seeds from Lagos. Coll., H. Green. A species, like *Silvanus surinamensis*, &c., of widely extended distribution, associated with rice and various seeds—included in the "British List," but not necessarily or even probably a member of the British fauna in its strictly natural sense.

Carabidae.

Amara trivialis, *Gyll.* In Trop. Fern House. Coll., E. W. Morse. A common British ground beetle.

(*Exotic species.*)

Cryphaloides donisthorpei, *Formanck.* This interesting species to which reference has already been made (see *K. B.*, 1908, p. 121) has been described as new to science by Formanck, who has named it in honour of its captor Mr. H. St. J. Donisthorpe, of Kensington. It is a small cylindrical insect which bores tunnels and galleries in and under the bark of some kind of tree. The genus *Cryphaloides* is closely allied to *Cryphalus*, Er., of which we have British species which feed in beech, lime, and larch, and might, if they were less rare than they are, do considerable damage to such trees.

Baris (Acythopus) aterrimus, *Wat.* = *ochicora*, Blackburn. Found in a plant of *Dendrobium secundum* from Malaya. In Orchid Houses. Coll., A. C. Miles.

This beetle was undoubtedly imported with the orchid, since it is a native of the Malay States. It has occasionally been taken elsewhere in England, associated with imported Dendrobia.

Formicomus pedestris, *Rossi.* A specimen was found associated with ants (*Cremastogaster*) in cork in the Fern Houses. Coll., J. S. Christie. In Europe it inhabits Italy.

A heteromerous beetle which comes near our *Anthicus*. This beetle is figured (fig. 3) in the plate, and some notes are added on this interesting species by Mr. Donisthorpe (*see* p. 251).

Bruchus natalensis (?). Imported in seeds of *Parkinsonia* from S.W. Africa.

Bruchus sp. ? Imported in seeds of *Convolvulus nigerianus* from N. Nigeria.

Bruchus sp. ? Imported in leguminous seeds from South Africa.

The three specimens of *Bruchus*, two of which, at least, appear to be undescribed, were collected by J. Scott in seeds imported from Africa.

Examples of the second species are to be found in the British Museum from Angola and other places in W. Africa.

Bruchus sp. ?

Mechistocerus sp. ?

Cryphalus sp. ?

Imported from Lagos. Coll., H. Green, in seeds.

The *Mechistocerus* was found in leguminous seeds, and appears to be new to the British Museum collection, and has probably not yet been described.

THYSANOPTERA.

Richard S. Bagnall.

Until recently only three species of thrips were recorded from European hothouses, namely, *Heliothrips haemorrhoidalis*, Bouché; *H. femoralis*, Reuter, and *Parthenothrips dracaenae*, Heeger. In 1904, however, Prof. Reuter described *Leucothrips nigripennis*, from hothouses, Helsingfors, Finland, found on species of *Pteris*; and in 1907 Mr. Dudley Moulton described *Euthrips orchidii*, from four specimens found on orchids in a hothouse, California, U.S.A. The writer has taken both *Leucothrips nigripennis*, Reuter, and *Euthrips orchidii*, Moulton, in the houses of the Botanical Gardens, Brussels, and from greenhouses in the North of England, and this year described *Euthrips longipennis* and *Cephalothrips spinosus* from Brussels, and *Anaphothrips orchidaceus* from England, Ireland, Scotland, and Belgium. *Euthrips longipennis*, Bagnall, has occurred plentifully in the Palm House of the Leazes Park, Newcastle.

It is very probable that *Leucothrips nigripennis*, Reuter; *Euthrips orchidii*, Moulton, and *E. longipennis*, Bagnall, will ultimately occur in the Kew houses; they are all small species (about $\frac{3}{4}$ mm. in length) and might be easily overlooked. *Cephalothrips spinosus*, Bagnall, can scarcely yet be regarded as a true hothouse species, being described from a single specimen found on the leaf of *Strelitzia Nicolai*.

We are only able to put on record five specimens of *Thysanoptera* from the conservatories and propagating pits of the Royal Botanic Gardens, Kew, four of which have been collected by the late Mr. George Nicholson; and none from the Gardens proper, though it is practically certain that the wild thrips-fauna will be a comparatively large one.

It should be said that the houses are peculiarly free from these little pests. The writer on two occasions spent the whole day

collecting in the propagating pits as well as the larger houses ; on the first occasion a single specimen of *Heliothrips haemorrhoidalis*, Bouché, was seen, and on the second, when special search was made for the species heretofore mentioned, only a few specimens of *Anaphothrips orchidaceus*, Bagnall, and *Thrips tabaci*, Lindeman, were captured. It is probable that the various ants which swarm in most of the houses help to keep down the thrips ; the writer has found many species of hothouse thrips freely in several well-regulated and attended houses where ants are absent or scarce, but has always found thrips to be very scarce in houses infested by ants.

THYSANOPTERA.

Terebrantia.

Thripidae.

Anaphothrips orchidaceus, *Bagnall : Ent. Mon. Mag.*, 2nd ser., xx., p. 33, and *Ann. de la Soc. Entomologique de Belgique*, liii., p. 171, 1909.

Collected by the late Mr. G. Nicholson from *Zygopetalum*, and by the writer from *Epidendrum* and *Cymbidium* (Feb. 2nd, 1909). It also occurs on *Cypripedium* and *Odontoglossum*.

Heliothrips haemorrhoidalis, *Bouché*, and **H. haemorrhoidalis var. abdominalis**, *Reuter*.

On various hothouse plants.

H. femoralis, *Reuter*.

Collected by the late Mr. G. Nicholson from *Lissochilus* sp., *Lardizabala biternata*, *Agonis flexuosa*, and *Hibbertia dentata*, and by the writer from *Pteris* sp.

Parthenothrips dracaenae, *Heeger*.

Collected by the late Mr. G. Nicholson from *Dracaena* sp.

Thrips tabaci, *Lindeman* (*T. communis*, Uzel).

Larvae and perfect insect on *Iresine* spp. in one of the propagating houses, Feb. 2nd, 1909.

PISCES.

Cyprinus carpio, " The Carp."

A splendid specimen of this species was taken from the pond in June, 1906, and presented to the Natural History Museum, South Kensington, for preservation. It weighed between twelve and thirteen pounds, and was, considering the time of the year, in exceptionally fine condition. The scales were large and on the sides had the pronounced golden bronze tint.

The carp, which has the teeth in the throat, is principally a vegetarian, and, where food is plentiful, attains at times large dimensions. One caught at Harting great pond, near Petersfield, in 1858, weighed 24½ pounds. It is not indigenous to Britain, being a native of Chinese waters, but has become thoroughly naturalized over the greater part of Europe. It was introduced into England in the fifteenth century, and soon became an important article of food, its propagation being fostered by the religious communities then existing. Its introduction to American waters has been attended

by unforeseen consequences. In the Southern States it has spread with marvellous rapidity and in such numbers as to be a menace to the rice crops. The fish burrow and wallow in the soft mud of the rice fields, destroy the roots, and eat the fresh young shoots. Government action has had to be taken to reduce the numbers of the fish, but up to the present the efforts have not been attended with any great success.

Leuciscus cephalus, "The Chub."

A fish of about a pound in weight was seen by the writer rising at the flies in the Ha-ha on August 4th, 1906. This is interesting owing to the fact that the chub is becoming decidedly scarce—indeed it has almost disappeared from the Thames—below Teddington. Anglers wishing to make anything of a catch of chub in the Thames have to go above Sunbury to attain their object. Many years ago it was plentiful even around Old London Bridge, but being a lover of pure water it has gradually been driven to the upper reaches of the river. This love of pure water is not characteristic of many other cyprinoid fish, the carp, for instance, seeming to thrive best in water which is thick and muddy.

Like the carp the chub has pharyngeal teeth, but is not a strict vegetarian. It will rise freely to big bushy flies, and at times will not disdain a lively minnow. Also it is particularly partial to large soft cherries.

It is widely distributed throughout temperate Europe and Asia Minor, and in America is represented by the chub "suckers." The largest fish in England are caught in the Hampshire Avon and Dorchester Stour, Christchurch being a favored locality where fish of over seven pounds weight have been captured. It makes but insipid food, Isaac Walton being probably the only man who ever said anything in its favour, and his may only have been an acquired taste.

XXXIII.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECADES LII-LIII.

511. **Berberis approximata**, *Sprague* [Berberidaceae]; affinis *B. dictyophyllae*, Franch., a qua foliis plerumque denticulatis, floribus multo minoribus, glandulis petalorum approximatis recedit.

Rami juventute pruinosi. *Folia* obovata, 0·5–2 cm. longa, 2·10 mm. lata, mucronulata vel obtusa, denticulata vel integra, supra viridia, subtus pruinosa. *Spinae* graciles, usque ad 1·5 cm. longae. *Flores* solitarii vel bini, pedicellis 4–5 mm. longis. *Sepala* exteriora elliptica, 3·5–4 mm. longa, 2·5–3 mm. lata, interiora late elliptico-obovata, 5–6 mm. longa, 3·5–4·5 mm. lata. *Petala* obovata, circiter 5 mm. longa, 3–3·5 mm. lata, breviter bifida, glandulis oblique ovatis approximatis vel contiguis 1–1·5 mm. longis, 0·5–0·75 mm. latis. *Stamina* 3·5 mm. longa. *Pistillum* 3–3·5 mm. longum, ovario 2–2·5 mm., stylo 0·5–0·75 mm. longo; ovula 5–6.

Bacca rubra, pruinosa, obovoidea vel subglobosa, 6–7 mm. longa, 5–6 mm. crassa, stylo obvio, stigmate usque ad 1·5 mm. diametro.—*Berberis dictyophylla*, Hook. f. Bot. Mag. t. 7833, quoad stirpem cultam, non Franch.

China. Introduced by Vilmorin, Andrieux & Co., and described from specimens cultivated at Kew.

The genus *Berberis* has recently been revised by Schneider (Bull. Herb. Boiss., ser. 2. vol. v. p. 33), who has taken a more restricted view of the species than previous authorities have done. If Schneider's conceptions be adopted, then *B. approximata* must be treated as specifically distinct from *B. dictyophylla*. Taking a broader view, however, it might be regarded as a well-marked variety of the latter.

512. **Brownlowia Havilandii**, *Stapf* [Tiliaceae]; affinis *B. Denysianae*, Pierre, sed indumento insigniter lepidoto, inflorescentia laxa, floribus paulo minoribus, staminodiis subulatis distincta.

Arbuscula, 6 m. alta, ramulis junioribus dense lepidotis, demum glabratis cortice griseo-brunneo tectis. *Folia* lamina peltata, cuspidato-acuminata, ambitu ovato-rotundata, integerrima, 30 cm. longa, 20–25 cm. lata, firme chartacea, supra glabra, subtus minute et dissite albido-lepidota, nervis primariis circiter 9 quorum 4 inferiores perbreves, secundariis (e costa ortis) utrinque 3–4, omnibus subtus prominentibus, venis transversis laxis uti reticulatione gracili prominulis; petiolus ad 18 cm. longus, apice calloso-incrassatus, 5 cm. supra basin laminae insertus. *Panicula* terminalis, ultra 30 cm. longa, 15 cm. lata, perlaxa, undique lepidota; pedunculus brevis bracteis 4–5 sterilibus oblongis ad 2 cm. longis concavis munitus; rami distantes ascendentes vel suberecti, robusti, bracteis caducis; pedicelli robusti, 5–6 mm. longi, basi disarticulati. *Calyx* dense lepidotus subcampanulatus, 1·2 cm. longus, ad medium partitus, lobis triangulari-ovatis acutis. *Petala* alba, oblonga vel elliptica, 1·5–2·0 cm. longa, circa 7 mm. lata. *Gonophorum* subcylindricum, 2 mm. longum. *Filamenta* ad 1 cm. longa. *Staminodia* subulata, 6 mm. longa. *Carpella* 5, lepidota; stylus stamina paulo superans, apice tantum divisus.

Borneo. Sarawak, near Kuching, *Haviland*, 893.

513. **Triumfetta ramosa**, *Sprague et Hutchinson* [Tiliaceae]; affinis *T. actinocarpae*, S. Moore, a qua foliis majoribus, capsula triloculari, setis hispidis pilis pluribus terminatis differt.

Fruticulus circiter 23 cm. altus, virgate ramosus; ramuli congesti, stricte ascendentes, leviter flexuosi, 1–2 cm. diametro, superne tomentelli, inferne furfuraceo-puberuli. *Folia* elliptico-ovata, basi leviter cordata, apice obtusa vel rotundata, 1–2·5 cm. longa, 1–2 cm. lata, crenulato-serrulata, basi 7-nervia, utrinque (subtus densius) tomentella; petioli 3–8 mm. longi. *Cymae* in nodis solitariae, triflorae. *Gonophorum* 0·75 mm. longum; glandulae subquadratae, 0·5 mm. longae, 0·6 mm. latae. *Discus* membranaceus, ciliatus, in toto circiter 0·5 mm. altus. *Capsula* setis inclusis vix ultra 2 cm. diametro, trilocularis, loculis 1–2-spermis septo tenui falso divisis, corpore pubescente 8 mm. diametro, setis 5–7 mm. longis hispidis, pilis lateralibus 1–2 mm. longis, pilis terminalibus pluribus 0·25–0·3 mm. longis. *Semina* 3 mm. longa.

N.W. Australia. Nicol Bay and De Grey River, *Ridley's Expedition*.

514. Triumfetta triandra, *Sprague et Hutchinson* [Tiliaceae]; affinis *T. plumigerae*, F. Muell., a qua alabastris gracilioribus, floribus triandris, petalis pro rata angustioribus, ovariis et capsulis ovoideis, setis brevius pilosis, necnon indumento foliorum subtiliore recedit.

Folia oblonga, utrinque angustata, 2–5 cm. longa, 0·7–1·3 cm. lata, crenulato-dentata, indumento subtili subgriseo asperulo. *Sepala* 5–5·5 mm. longa cornu excluso, 0·6 mm. lata; cornu 0·7 mm. longum, 0·25 mm. infra apicem insertum. *Petala* spathulato-oblanceolata, apice rotundata, 3 mm. longa, 0·8 mm. lata, inferne 1·2 mm. pubescentia et ciliata, ungue inferne valde incurvo. *Gonophorum* constrictum, 0·25 mm. longum; glandulae ellipticae. *Discus* membranaceus, 0·3 mm. longus, ciliatus. *Stamina* 3, 3–5 mm. longa. *Ovarium* ovoideum, triloculare, 1 mm. longum. *Capsulae* juniores ovoideae, setis inclusis 5–6 mm. longae; setae 1·5–2 mm. longae, breviter pilosae, pilis pluribus terminatae.—*T. plumigera*, Benth., Fl. Austr., vol. i., p. 274, partim, non F. Muell.

N.W. Australia. Montague Sound, *Cunningham*, 236; without precise locality, *Bynoe*.

515. Triumfetta plumigera, *F. Muell.* [Tiliaceae]; descriptio amplificata (auctore T. A. Sprague).

Folia indumento grosso subfulvo aspero. *Sepala* 5 mm. longa cornu excluso, 0·7–0·8 mm. lata; cornu 1 mm. longum, 0·3 mm. infra apicem insertum. *Petala* oblanceolata, 4 mm. longa, 1·4 mm. lata, inferne 0·75 mm. intus pubescentia et ciliata. *Stamina* 10. *Ovarium* globosum, triloculare. *Capsulae* globosae, setis 6–8 mm. longis longe pilosis pilis pluribus terminatis.

N. Australia. Depot Creek, sources of the Victoria River, *Mueller*. Queensland. Endeavour River, *Cunningham*.

Neither Mueller nor Bentham gives the number of the stamens, which is an important character in *Triumfetta*. Bentham, in *Fl. Austr.*, vol. i., p. 274, states that the ovary is 2-celled.

516. Rubus Veitchii, *Rolfe* [Rosaceae-Rubeae]; a *R. flosculoso*, Focke, foliolis grosse dentatis et floribus paucis et majoribus differt.

Frutex, ramuli aciculati, pruinosi, teretes. *Folia* alterna, pinnata, 6–15 cm. longa; foliola 5–9, lateralia elliptica vel oblique ovata, grosse dentata, 1–3 cm. longa, terminalia ovato-lanceolata vel rhombea, 4–8 cm. longa, grosse dentata vel subpinnatifida; supra viridia, puberula vel sericea, subtus incana; rachis aciculata et pubescens; stipulae lineari-lanceolatae, acuminatae, circa 5 mm. longae. *Flores* in paniculas terminales pauciflоras dispositi; pedicelli dense pubescentes. *Calyx* dense pubescens, lobis triangularibus acuminatis patentibus. *Petala* orbiculari-obovata, 3 mm. longa, purpurea. *Stamina* erecta, 3 mm. longa, purpurea. *Carpella* sericea; styli glabri, 2 mm. longi, carnei. *Fructus* globosus, 1·5 cm. latus, drupis numerosis parvis globosis glabris rubris.

Western China. Valleys up to 7000 ft., *Wilson*, 3483.

Flowered with Messrs. James Veitch & Sons, in August, 1908, the plants having been grown from seeds sent by Mr. E. H. Wilson. It must also be allied to *R. Giraldianus*, Focke, a species which is not represented at Kew.

517. **Rubus omeiensis**, *Rolfe* [Rosaceae-Rubeae]; a *R. pinnatisepalo*, Hemsl., caule et petiolis haud aciculatis et floribus paniculatis differt.

Frutex, ramuli inermes, velutini, subflexuosi. *Folia* alterna, simplicia, petiolata, breviter 5-lobata vel interdum obscure 7-lobata, lobis sinuatis vel sublobatis, irregulariter dentatis, supra glabra minutissime puberula et pulchre rugosa, infra infinite reticulato-venosa et incana, 8–15 et interdum 23 cm. longa et lata; petiolus 4–8 cm. longus, velutinus; stipulae oblongae, profunde laciniatae, 1–2 cm. longae. *Flores* in paniculas terminales dispositi, numerosi, interdum subcongesti; pedicelli dense pubescentes. *Calyx* dense pubescens, lobis triangularibus acutis reflexis. *Petala* erecta, obovato-elliptica, 4 mm. longa, purpurea. *Stamina* numerosa, erecta, 4 mm. longa, filamentis albis. *Carpella* glabra; styli 4 mm. longi, albi. *Fructus* ignotus.

Western China. Mt. Omei, *Wilson*, 4851.

Mr. E. H. Wilson also sent seeds of this shrub to Messrs. James Veitch & Sons, who, in August, 1908, communicated flowering specimens to Kew. It may also be nearly allied to *R. Cavaleriei*, Lév. et Van., although not identical with it, as the sepals cannot be described as much longer than the rest of the flower, nor could the authors have overlooked the remarkable stipules of this plant.

518. **Hydrocotyle Versteegii**, *Hemsl.* [Umbelliferae-Hydrocotyleae]; species ex affinitate *H. javanicae*, Thunb., a qua differt foliis ambitu reniformibus et umbellis subsolitariis breviter pedunculatis.

Herba late repens, parce puberula, caulibus elongatis gracillimis debilibus ad nodos saepe radicantibus. *Internodia* nonnumquam usque ad 15–20 cm. longa. *Folia* graciliter petiolata, erecta; lamina membranacea, reniformis, 1–5 cm. lata, 5–7-lobulata, lobulis rotundatis crenato-dentatis; petiolus filiformis, erectus, 1–10 cm. longus. *Umbellae* dense capitatae, ad nodos solitariae vel interdum binae, altera subsessilis, altera distincte sed breviter pedunculata, multiflorae, floribus brevissime pedicellatis. *Flores* non visi. *Fructus* glaber, latior quam longus, 1·5–2 mm. latus; carpella valde compressa; in latere indistincte 1-costata, stylis persistentibus patentibus vel recurvis.

Dutch New Guinea. Alkmaar, *G. Versteeg*, 1497.

I have not been able to match this plant with any specimens at Kew, and in describing it I have only taken *H. javanica*, Thunb., into account as described and figured by the author, not as understood by some later writers.

519. **Mackinlaya confusa**, *Hemsl.* [Araliaceae-Mackinlayeae]; species *M. amplifoliae*, Hemsl., proxima sed fere omnibus partibus minor, et ab ea foliolis saepius distincte paucilobatis et inflorescentia folia excedente differt.

Herba ampla (*Macgillivray*), undique glabra, ramis floriferis graciliusculis. *Folia* digitatim 5-foliolata, suprema pedatipartita, circiter 12 cm. diametro, breviter petiolata; foliola valde inaequalia,

2 inferiora intermediis adnata, sessilia, anguste lanceolata, 5-10 cm. longa, integra, obtusa, caetera distincte petiolulata, cum petiolulo circiter 15 cm. longa, petiolis 3–4 cm. longis, supra medium trilobata, lobis lateralibus multo brevioribus; folia inferiora cum petiolo perfecto non visa, sed foliola majora, fere elliptica, utrinque 3–8 lobulata. *Inflorescentia* terminalis, stipitata, stipite 15–20 cm. longo, umbellata, decomposita, 15–20 cm. diametro; radii primarii 15–20, graciles, 5–10 cm. longi; umbellulae ultimae 3–6-florae; pedicellis fere capillaribus inaequilongis; bracteae lineari-lanceolatae, 1–15 cm. longae, acuminatissimae; bracteolae similes sed minores. *Flores* (masculi tantum visi) minimi, iis *M. amplifoliae* simillimi.

M. macrosciadea, Benth. Fl. Austral. vol. iii. p. 383, quoad plantam ex insula Dunk, non F. Muell.

Queensland. Dunk Island, Rockingham Bay, June 5th, 1848, *John Macgillivray*, 269.

Macgillivray's 269 β, from Fitzroy Island, a degree farther north, is *M. macrosciadea*, F. Muell. Both species occur in the Rockingham Bay district.

There is some uncertainty about the size, habit and duration of the plants included here under the genus *Mackinlaya*. Mueller gives no dimensions in his original description of *Panax macrosciadea*, nor in his definition of the genus *Mackinlaya*, but in his "Essay on the Plants of the Burdekin Expedition," he mentions it as a tree 20 to 30 feet high. Bailey, *Queensland Flora*, part 2, p. 730, describes it as a slender shrub or small tree, and Hill's label records it as a slender shrub. In Macgillivray's manuscript list at Kew of his botanical collections his n. 269 (*M. confusa*, Hemsl.) is defined as a "large herb. plant with 5-digitate leaves." Versteeg notes *M. amplifolia*, Hemsl., as a tree 3 metres high. It is probable that the stem or trunk, as in so many other relatively small members of the *Araliaceae*, is unbranched at the base.

520. **Mackinlaya amplifolia**, *Hemsl.* [Araliaceae-Mackinlayeae]; species robusta a *M. macrosciadea*, F. Muell., foliorum amplitudine ac divisione, inflorescentia umbellata ad gradum quintum divisa, radiis primariis circiter 10 tantum et umbellulis ultimis paucifloris recedit.

Arbor 3-metralis (*Versteeg*) omnino glabra, ramis floriferis crassis. *Folia* composita, digitatim vel pedatim secta, simul nonnunquam pseudopinnata, ampla, cum petiolo communi usque ad 60 cm. longa (inferiora forsan longiora); foliola 5 vel 7, inaequalia, ovato-lanceolata, cum petiolulo 15–35 cm. longa, acuminata, acuta, basi cuneata vel late rotundata, integra vel obscure lobulata et remote denticulata, lateralia plus minusve obliqua, 2 infima multo minora, breviter petiolulata, intermedia, ut terminale, longe petiolulata, terminale indivisum vel pinnatim tripartitum segmentis lateralibus obliquis segmento terminali longe petiolulato; petiolus communis validus, usque ad 30 cm. longus, teres, striatus, basi anguste vaginans, caulem vel ramum amplectens. *Inflorescentia* terminalis, longe stipitata, umbellata, decomposita, circiter 30 cm. diametro, foliis brevior; radii primarii circiter 10, 12–18 cm. longi; umbellulae ultimae 3–6-florae, pedicellis brevissimis inaequilongis; bracteae et bracteolae lineari-lanceolatae, sursum gradatim minores,

inferiores 1–1·5 cm. longae. *Flores* (masculi tantum visi) 1·5–2 mm. diametro; calycis dentes lanceolati, acuti, quam petala inflexa longiores.

Dutch New Guinea. Geiten Noord, *G. Versteeg*, 1442.

F. Mueller founded the genus *Mackinlaya* (*Fragm. Phytogr. Austral.*, vol. iv., p. 119, t. 29) on specimens of a plant collected at Port Molle and Rockingham Bay; but he had previously described (op. cit., vol. ii., pp. 108, 176) this plant under the name of *Panax macrosciadeus*, from specimens collected by E. Fitzalan, "ad Portum Mòlle insularum Cumberland Islands," Queensland, Australia. Subsequently Bentham (*Flora Australiensis*, vol. iii., p. 383) added some additional localities, including Fitzroy Island and Dunk Island, from the collections of J. MacGillivray. The specimen in question from Fitzroy Island is the genuine *Mackinlaya macrosciadea*, F. Muell., and it has since been collected in the same island by W. Hill; but the Dunk Island plant is quite different, though I think it may be referred to the same genus, at least until female flowers and fruit are known, both being wanting at present.

A third species, closely related to the Dunk Island plant, has been collected by Mr. G. Versteeg, in Dutch New Guinea. Both species differ from *M. macrosciadea* in having a larger, decompound, male inflorescence and of both only young male flowers are known. Male and female flowers and ripe fruit of *M. macrosciadea* are amply represented at Kew. The umbels are branched to the second place only, and the baccate fruit is didymous.

So far as the material goes the previously undescribed species differ from the original species in no essential character, unless the decompound umbels be considered as such. All three species have petals with strongly inflexed tips, which are exceptional in the *Araliaceae*, but they are valvate in aestivation, as in *Araliaceae* generally.

521. **Vernonia Dalzelliana**, *Drummond et Hutchinson* [Compositae-Vernonieae]; affinis *V. salignae*, DC., et *V. extensae*, DC., a priore capitulis paucioribus multo majoribus et achaeniis pilosis facile distinguitur, a *V. extensa* phyllariis conspicue angustioribus et acuminatis nec obtusissimis, achaeniis etiam manifestius pilosis nec glandulosis recedit.

Suffrutex gracilis, erectus vel subscandens, circiter 1 m. altus, ramis anfractuosis angulatis argute et crebre sulcatis puberulis vel denique glabratis. *Folia* oblanceolata vel oblongo-lanceolata, ad medium caulem, ubi maxima, 12–20 cm. longa, 3–6 cm. lata, sensim acuminata, obscure mucronata, plus minus irregulariter repando-serrata, serris acutis vix magis quam 7 mm. distantibus, utrinque pilis minutis albidis plus minus adspersa, nervis lateralibus 7–11 supra plus minus infra prominentibus pallidis, secundariis laxe reticulatis manifeste anfractuosis ad margines per serras in mucronem minutum excurrentibus, omnibus pilis furcatulis frequentius ornatis, pagina inferiore (in planta sicca) pallide virescente. *Ramuli florescentes* villis fuscescentibus caducis sparsius vestiti vel omnino glabrati. *Capitula* 3–10, subcorymbosa, subcampanulata. *Phyllaria* circiter 7-seriata, ab extra conspicue magnitudine increscentia, extrema valde minuta, omnia lanceolata, acuta, dorso carinata, margine

utroque subscarioso, superne pubescentia apice plus minus colorata, post anthesim stellate patentia. *Corollae tubus* tenuissimus, 1 cm. longus; lobi argutissimi, circiter 5 mm. longi. *Achaenia* subteretia, pluri-sulcatula, 3 mm. longa, pilis argenteis ascendentibus munita, versus apicem quasi in patellam incrassata, basi pulvinulo areolato, eburneo suffulta, pappo circiter 7 mm. longo minutissime barbulato albescente coronata.

Southern India. Gondebyle Ghat, *Dalzell*, in Herb. Hort. Calc.; Gairsoppa Falls, North Canara, *Talbot*, 1401; Coorg, *Cameron*; Maruhalli, Mysore, *Meebold*, 8473.

This appears to be *Decaneurum lilacinum*, Dalzell & Gibson, Bombay Fl. p. 314 (1861), of which, as stated in Fl. Brit. Ind. iii. p. 241, there is no specimen, under that name at least; we have had before us, however, a specimen of Dalzell's, now in the Calcutta Herb. (from Gondebyle Ghat, as above), collected evidently in the same region as "Decaneurum lilacinum" *i.e.*, on the Ghats South of Bombay) which Mr. Hemsley has already pointed out in a note on a specimen from T. Thomson's Herbarium, supposed to have been collected in Coorg, to be our plant, which is named in ms. "Decaneurum glabrum." Dalzell & Gibson's specific name is preoccupied, under *Vernonia*, by *V. lilacina*, Martius ex DC. Prodr. v. 48, from Brazil. We have not been able to see *Decaneurum glabrum*, DC., but from the description it is not our plant.

522. Ceropegia discreta, *N. E. Brown* [Asclepiadaceae]; affinis *C. longifoliae*, Wall., sed glabra, corollae lobis multo minoribus et forma diversis differt.

Herba tuberosa, caule volubili gracili glabro. *Folia* coriacea vel subcarnosa, petiolata; petiolus 7–10 mm. longus; lamina 6–10 cm. longa, 6–8 mm. lata, lineari-lanceolata, acuminata, glabra, minute adpresse ciliata. *Umbellae* laterales, pedunculatae, 2–8-florae. *Pedunculi* 1·8–3·5 cm. longi, graciles, glabri. *Bracteae* 1–3 mm. longae, subulatae. *Pedicelli* 6·8 mm. longi, graciles, glabri. *Sepala* 3·5–4 mm. longa, subulata, glabra. *Corolla* 3 cm. longa, curvata; tubus 2·3 cm. longus, basi inflatus, elliptico-oblongus, albidus, fusco-venosus, superne cylindricus, purpureus, extra glaber, intra basi excepta pilosus; lobi conniventes, apice connati, 6 mm. longi, basi 3 mm. lati, ovato-lanceolati, replicati, intra carinati, basi pallide lutei, apice purpureo-virides et intra pubescentes, carina longe ciliata. *Corona exterior* dentibus 5 deltoideis obtusis erectis coronae interioris lobis oppositis cum sacculis 5 minutis alternantibus. *Coronae interioris lobi* 2 mm. longi, anguste spathulato-lineares, basi conniventes, deinde leviter divergentes, apice incurvati et connati, lutei, glabri.

India. Collected in Coimbatore by the Conservator of Forests of Coimbatore, and sent, in 1907, from the Royal Botanic Garden, Calcutta, to Kew, where it flowered in October, 1908.

523. Rehmannia Henryi, *N. E. Brown* [Scrophulariaceae]; affinis *R. angulatae*, Hemsl. sed humilior, foliis obtuse lobatis et dentatis, bracteis longe petiolatis, calycis lobis latioribus et corolla alba differt.

Herba perennis 15–40 cm. alta, simplex vel basi ramosa, ubique glanduloso-pilosa. *Folia* radicalia 7–18 cm. longa, 2·5–6 cm. lata,

elliptico-oblonga, obtusissima, basi in petiolum 1–6 cm. longum attenuata, crenato-dentata vel plus minusve pinnatim lobata et obtuse dentata; folia caulina vel bracteae similima, gradatim minora, longe petiolata. *Flores* axillares, 3–6 cm. distantes. *Pedicelli* adscendentes, 3–5 cm. longi, basi bracteolis 1–2 subulatis 2–4 mm. longis muniti. *Calyx* adscendens (haud nutans) campanulatus, lobis patentibus; tubus 1–1·3 cm. longus; lobi subaequales 1–1·2 cm. longi, 5–9 mm. lati, anguste vel late deltoidei, obtusi, glandula brunneo-aurantiaca subapiculati, integri vel pauce dentati. *Corollae* tubus 4·5–5 cm. longus, dorsaliter compressus, apice 2 cm. latus, extra pubescens, sordide sulfureus, minute rubro punctatus, intra inferne glaber, superne pubescens, luteus, minute rubro-punctatus; limbus obliquus, bilabiatus, 4·5 cm. diam., albus, utrinque pubescens; labium superius bilobum, lobis subquadratis apice obtusissime rotundatis emarginatis; labium inferius fere ad basin trilobum, lobis 2·5 cm. longis 1–5 cm. latis oblongis apice rotundatis, medio lateralibus imbricato, palato bicarinato dorso faucis adpresso. *Stamina* inclusa, glabra, antherarum loculis 3 mm. longis deflexo-divergentibus. *Ovarium* ovoideum, glabrum; stylus inclusus, glaber; stigmata late rotundata.

China. Nanto and mountains to the northward, *Henry*, 3839; Ichang, *Henry* 1157, 1376; without precise locality, *Wilson*.

Described from living plants raised from seeds collected by Mr. Wilson in China, and contributed to Kew by the Director of the Arnold Arboretum.

524. **Incarvillea grandiflora**, *Bur. et Franch.* var. **brevipes**, *Sprague* [Bignoniaceae-Tecomeae]; a typo pedunculo quam pedicellis multo longiore recedit.

Herba 15–40 cm. alta, minute papilloso-puberula mesophyllo foliorum excepto. *Folia* 2–5, in toto 5–30 cm. longa, pinnatipartita vel segmento terminali tantum evoluto; segmenta crenato-serrata, terminale suborbiculare, 3–12 cm. diametro, basi rotundatum vel subcordatum, apice rotundatum vel obtusissimum, lateralia utrinque rhacheos 3–4 (1–5), ovato-oblonga, 1·5–6 cm. longa, 1–3·5 cm. lata, basi rotundata vel cordata, apice obtusa vel subacuta; petiolus 2–17 cm. longus. *Pedunculus* solitarius, 5–25 cm. longus, 2–4 (1–5)-florus; bracteae 1–2 cm. longae; pedicelli 1–2·5 cm. longi; flores aperti 1–2. *Calycis tubus* 1·4–2 cm. longus, quinque-alatus, extus inferne interdum nigro-punctatus; lobi ovato-deltoidei, acuminati, 5–6 mm. longi. *Corollae tubus* 4–6 cm. longus, intus luteus, vittis duabus albis in basin cujusque lobi incurrentibus; limbus roseus vel roseo-purpureus, 5–7·5 cm. diametro.

China. N. W. Yunnan: on barren, dry, stony ground on plain at the north end of the Lichiang valley, 2700 m., *Forrest*, 2131; in open mountain meadows on the eastern flank of the Lichiang Range, 3300 m., *Forrest*, 2464.

A batch of *I. grandiflora* var. *brevipes* was exhibited in May 1909 at the Temple flower-show under the name "*I. Bonvalotii*" by Bees, Ltd. The above description was drawn up partly from the living plants and partly from Forrest's dried specimens which were kindly lent for the purpose by Prof. I. Bayley Balfour, who

has also presented two photographs of plants grown in the Royal Botanic Garden, Edinburgh, and one of the species in its natural habitat.

525. Phyllanthus chiapensis, *Sprague* [Euphorbiaceae-Phyllantheae]; affinis *P. laxifloro*, Benth., a quo foliis minoribus obovato-oblongis rotundatis, inflorescentiis brevioribus differt.

Frutex 2 m. altus, ramulis 2–4 mm. diametro tetragonis glabris, angulis leviter alatis. *Folia* obovato-oblonga, apice rotundata, basi subcuneata, 3·5–5 cm. longa, 1·5–2·3 cm. lata, supra obscura, glabra, venis inconspicuis, venulis occultis, subtus pallidiora, in mesophyllo minutissime furfuraceo-lepidota, tandem cana venulis conspicuis; venae laterales utrinque 6–7; petioli 4 mm. longi; stipulae ligulares, 5 mm. longae, 1·75 mm. latae. *Paniculae* 3–6 cm. longae. *Flores* ♂ rubentes, fere ut in *P. laxifloro*, ♀ ignoti. *Stamina* 3. *Capsula* depresso-globosa, ultra 3 cm. diametro, nigro-brunnea. *Semina* angulato-ovoidea, circiter 1 cm. longa.—*P. laxiflorus*, Hemsl. Biol. Centr. Amer. Bot. iii. 104, partim, non Benth.

Mexico. State of Chiapas, on dry hills at Cacate, *Linden*, 1634.

A dried specimen and a capsule of *P. chiapensis* have been received from Mr. H. M. Hall, Department of Botany, University of California. These were from a bush cultivated at Santa Barbara, California.

P. chiapensis belongs to a little-known group of *Phyllanthus* which includes *glaucescens*, Kunth, *adenodiscus*, Muell. Arg., *laxiflorus*, Benth. (DC. Prod. vol. xv. pt. 2, p. 374), and *tequilensis*, Robins. & Greenm. (Proc. Amer. Acad. vol. xxix. 1894, p. 392). *P. tequilensis* differs from the other species in having only two stamens in the male flower. The large fruit appears to be characteristic of the group.

526. Trigonostemon thyrsoideum, *Stapf* [Euphorbiaceae-Crotoneae]; *T. philippinensi*, Stapf, consimile, sed inflorescentiae unisexuales, flores masculi sepalis petalisque 5-nis.

Arbuscula, ad 5 m. alta, inflorescentiis exceptis glabra, ramulis superne sulcatis. *Folia* lanceolata vel oblongi-lanceolata, basi acuta vel subobtusa, remote crenato-dentata, dentibus apice glandula (hydatodo) terminatis, 18–32 cm. longa, ad 8 cm. lata, papyracea, nervis secundariis utrinque 9–11 obliquis tenuibus; petioli circiter 5 cm. longi, subgraciles. *Inflorescentiae* terminales, e basi ramosae, thyrsoideae, masculae ad 18 cm. longae, ad 12 cm. latae, foemineae (una tantum visa) 15 cm. longae, 8 cm. latae, omnibus partibus fulvo-pubescentes, inferne glabrescentes; rami inferiores ad 7 (♀) vel 10 (♂) cm. longi, ad $\frac{1}{3}$ vel $\frac{2}{3}$ indivisi, caeteri breviter nudi vel e basi florigeri; thyrsi masculi iterum iterumque ramulosi, ramulis pedicellisque tenuibus brevibus vel ad 4 mm. longis, thyrsi foeminei ob cymas plerumque reductas fere racemos referentes pedicellis robustioribus sub anthesi ad 3 mm. longis; bracteae thyrsi masculi subulatae, ad 3 mm. longae, caducae, thyrsi foeminei lineares vel subulatae, eae axis primariae herbaceae, ad 15 mm. longae, ad 3 mm. latae. Flos ♂. *Sepala* 5, rotundato-elliptica, ad 1·5 mm. longa, dorso pubescentia, marginibus membranaceis erosulis. *Petala* 5, oblonga, obtusa, 3–3$\frac{1}{2}$ mm. longa, flava, glabra. *Disci* glandulae 5, obovato-

oblongae. *Stamina* 3, 1·5 mm. longa, antheris columnae brevi insidentibus, loculis approximatis vel magis minusve distantibus, connectivo ultra antheras producto alte bilobo. Flos ♀. *Sepala* 5, iis floris masculi similes, sed tota herbacea. *Petala*, 5, ut in flore masculo, 4 mm. longa. *Disci* glandulae 5 in annulum haud altum 5-lobum connatae. *Ovarium* 3-lobum ; stigmata brevia, divaricato-biloba.

China. Yunnan, Szemao, 1500 m. alt., *Henry*, 11947.

The panicles seen are strictly unisexual, but whether they came from the same tree or not is uncertain. The difference in the appearance of the male and female inflorescences is rather striking, and the branching of the male thyrsus goes very much farther than in any other species of *Trigonostemon*. The thecae of the anthers are sometimes contiguous, but more often distant by as much as their own width.

527. Setaria surgens, *Stapf* [Gramineae-Paniceae] ; affinis *S. glaucae*, Beauv., sed habitu gracili, culmis fasciculatis ramosis geniculato-ascendentibus, gluma superiore multo longiore, valva fertili minus transverse rugosa distincta.

Gramen, ut videtur, perennans, sed saepe primo anno florens. *Culmi* graciles, glaberrimi, fasciculati, iterum geniculati, ascendentes, 30–40 cm. alti, 5–6-nodi, inferne vel e medio 1–2-ramosi, internodiis quam vaginis brevioribus saepe lateraliter egressis vel longioribus, summo plerumque longissime exserto, geniculis nigricantibus. *Foliorum vaginae* primo arctae, inferiorum deinde plerumque ab internodiis retractae, glabrae, laeves ; ligulae ad lineam densissime breviter ciliatam redactae ; laminae lineares, longe tenuiter attenuatae, 8–15 cm. longae, 2–4 (rarius ad 5) mm. latae, glaucae, inferne hincinde pilis tenuissimis longiusculis conspersae, laeves. *Spicae* spuriae cylindricae, 2–5 cm. longae, rhachi pubescente, ramulis oppositis vel verticillatis, verticillis sua longitudine vel saepius longius distantibus, setis in quoque ramulo circiter 8 prorsus scaberulis 8–12 mm. longis. *Spiculae* ambitu obovato-ellipticae, 2·5–3 mm. longae, albo-virides, glabrae. *Gluma* inferior late-ovata, acuta, vel apiculata, circiter 1 mm. longa, nervis 3–5 prominulis ; gluma superior sub anthesi spiculam aequans, demum saepe quarta parte brevior late ovata, apiculata, 5-nervis, nervis prominulis. *Valva* inferior glumae superiori similis, spiculae longitudine cum palea elliptica paulo breviore vacua ; valva superior fertilis a latere visa oblique ovata, acuta vel apiculata, transverse rugulosa, 5-nervis. *Antherae* 1·5 mm. longa. *Caryopsis* ambitu suborbicularis, ultra 1·5 mm. longa.

Dutch New Guinea, S.E. Merauke, in alang alang savannas, 9 Nov. 1907, *G. Versteeg*, 1907.

This species is also represented at Kew from the following localities : North Australia, Port Essington, Armstrong, 551 ; Port Darwin, comm. R. Schomburgk, 32 ; Victoria River, F. Müller ; without precise locality, R. Brown ; Queensland, Port Curtis, MacGillivray, B. 68 ; "Sub-Tropical New Holland" (probably Queensland), Mitchell.

Schomburgk's and Müller's specimens are considerably stouter than the remainder, whilst those from New Guinea represent the other extreme. The latter are very thin and drawn out, and evidently not more than one season old.

528. **Pollinia leptantha**, *Stapf* [Gramineae-Andropogoneae]; affinis *P. argenteae*, Trin., sed racemis numerosis, spiculis minoribus, articulis gracilioribus, valva superiore (fertili) brevissime dentata, antheris in spicula sessili minoribus, in pedicellata hebetatis minutissimis.

Gramen perenne, culmis in rhizomate brevissimo fasciculatis, innovationibus paucis intravaginalibus. *Culmi* florentes circiter 1 m. alti, teretes, glaberrimi, simplices, 4–5-nodi, internodiis plerisque exsertis. *Foliorum vaginae* teretes, infimae breves, castaneae, diu persistentes, caeterae ultra 15 cm. longae, striatae, laevissimae, praeter margines superiores et junctionem cum lamina pilosam glabrae, ad nodos glauco-pruinosae; ligulae brevissimae, in cilia densissima solutae, a dorso pilis longioribus stipatae; laminae lineares, longissime setaceo-attenuatae, ad 45 cm. longae, 2–5 mm. latae, rigidulae, suberectae, livide virides vel purpurascentes, praeter basin intus saepe hirsutam glabrae, costa tenui albida, nervis lateralibus primariis utrinque 3–4 prominulis. *Racemi* ad 25 in rhachi communi ad 1·5 cm. longa e nodis circiter 3 brevissime ramosa conferti, graciles, flexuosi, ad 12 cm. longi, albo-pilosi; articuli graciles, superne paulo incrassati, 2 mm. longi, dense patule ciliati, pilis summis articulum fere aequantibus; pedicelli articulis aequilongi et simillimi, nisi tenuiores. *Spiculae* sessiles cum callo brevi barbato 2·5 vel vix 3 mm. longae, oblongo-lanceolatae, inferne spadiceae, superne pallidiores. *Gluma* inferior apice subintegro hyalina, caeterum chartacea, ad flexuras a basi ad $\frac{3}{4}$ dense patule albo-ciliata, in dorso depresso glabra vel inferne pilosa, nervis utrinque 2 tenuissimis, uno in flexura, altero propinquo extra sito; gluma superior subnavicularis, obtuse carinata, superne hyalina, 1- vel obscure 3-nervis, infra apicem versus margines breviter pilosula. *Valva* inferior linearis obtusiuscula, glumas aequans, hyalina, enervis, ad margines implicatas superne ciliata, vacua; valva superior quam inferior brevior, anguste lanceolata, apice minute bidentata vel tota aristae adnata, arista tenui ad 7 mm. longa, pallide spadicea, columna perbrevi, subula torta flexuosa scabrida. *Palea* oblonga, hyalina, 0·5 mm. longa. *Stamina* 3; filamenta 1·25–1·4 cm. longa; antherae 0·5–0·7 longae, lineares. *Styli* basi breviter connati; stigmata fere 1·5 mm. longa, stylis paulo longiora. *Caryopsis* oblonga, subcylindrica, brunnea, 1 mm. longa, stylorum basi communi coronata. *Spiculae* pedicellatae, sessilibus simillimae nisi interdum paulo minores et staminibus hebetatis, filamentis ovario brevioribus, antheris subdidymis 0·16–0·12 mm. longis sterilibus.

Dutch New Guinea, S.E. Merauke in alang alang savanna, 30 Oct. 1907, *G. Versteeg*, 1851.

529. **Oxytenanthera Alopecurus**, *Stapf* [Gramineae-Bambuseae]; affinis *O. brachythyrso*, K. Sch., sed foliorum laminis subtus tenuiter tessellatis, inflorescentiis gracilioribus, spicularum glomerulis numerosioribus, spiculis 20–24 mm. longis, antheris 6 mm. longis, apice brevius micronulatis.

Frutex scandens. *Culmi* glaucescentes, fistulosi, circiter 1 cm. supra nodos tumidiusculi, infra nodos puberuli, demum glabrati, ramis fasciculatis 3–6-nis 10–15 cm. longis 6–7-nodis, internodiis

inferioribus 2–3 abbreviatis cataphyllis deciduis, caeteris vaginis foliorum perfectorum amplexis supra nodos annulo flexorio tenui nigricante cinctis. *Cataphylla* culmorum ignota, ramorum coriacea, glabra, infima brevia, lata, summum ad 4 cm. longum, lamina nulla vel ad apiculum reducta ; pulvilli basales persistentes, fuscescentes, dense emergentiis claviculiformibus apice spinulam reversam gerentibus interdum lateraliter coalitis obsiti. *Folia* culmorum ignota praeter vestigia vaginarum in fibras culmo adpressas soluta, ramorum 4–5 approximata ; eorum vaginae arctae, prominenter striatae, versus margines superne inter costulas puberulae et minute reverse spinulosae, ad junctionem cum lamina in dorso in jugum productae ; ligulae in fimbrias ad 7 mm. longas rigidas solutae ; laminae magis minusve horizontaliter dispositae oblongo-lanceolatae, costa inaequaliter divisae, latere inferiore latiore, acute acuminatae, basi subaequaliter rotundatae et brevissime in petiolum pubescentem contractae, superiores ad 15 cm. longae et 3·5 cm. latae, inferiores breviores et angustiores, siccae pallide virides, supra medium ad margines scabridae, caeterum laeves, praeter imam basin pubescentem glabrae, costa tenui, nervis lateralibus primariis utrinque circiter 7, totidem secundariis interjectis, venis transversis crebris subtus prominulis saepe per 2–3 interstitia secundaria productis rectis vel flexuosis. *Rami* florentes plerumque solitarii inter vel potius supra ramos foliigeros emortuos orti, inferne ramosi, 20–25 cm. longi, longiores nutantes inferne basi cataphyllis squamiformibus persistentibus obtecti, e nodis caeteris bracteas ad vaginas reductas caducas pulvillos annulares reverse scaberulos desinentes emittantes. *Racemi* compositi, bracteati, inferiores elongati ad 6 cm. longi, sequentes multi abbreviati, contracti, ex ima basi ramosi cum ramulis abbreviatis glomerulos elongatos vel globosos formantes, summi simpliciores ad fasciculos spicularum reducti ; bracteae ovatae, apiculatae, 4–6 mm. longae, subcoriaceae, subpubescentes, inferiores circiter 4 spiculas foventes. *Spiculae* uniflorae anguste cylindricae, 20–25 mm. longae, in pedunculis brevissimis bracteas parvas squamiformes 2–4 gemmiparas gerentibus ; rhachilla 2 mm. ultra anthoecium producta, setiformis, scaberula. *Glumae* (vacuae) convolutae, inferior lata, mucronulata, 3–4 mm. longa, superior elongata mucronata, dimidium spiculae aequans, utraque striato-multi-nervosa. *Valva* involuta, angusta, spiculam aequans, mucronata, mucrone spinescente ad 3 mm. longo, multi-nervosa. *Palea* angusta, involuta, valvam fere aequans, 2-carinata, intra carinas approximatas profunde sulcata, extra eas utrinque 6–7 nervis. *Lodiculae* nullae. *Stamina* 6 ; filamenta praeter apices in tubum angustum coalita, 16–18 mm. longa ; antherae pallide luteae, anguste lineares, 6 mm. longae, loculis breviter apiculatis, apiculis ciliolatis. *Ovarium* breviter stipitatum, cum stylo 16–17 mm. longum ; stigmata albida, breviter plumoso-papillosa, 8 mm. longa. *Fructus* ignotus.

Dutch New Guinea. Without precise locality, *G. Versteeg*, 1132.

530. **Nephrodium (Lastrea) lichiangense**, *C. H. Wright* [Filices-Polypodiaceae] ; *N. Brunoniano*, Hook., affine, pinnulis anguste deltoideis rhachique dilute stramineo differt.

Plantae dense caespitosae. *Caudex* crassus. *Frondes* oblongo-lanceolatae, 23–38 cm. altae, pinnatae ; stipites 7 cm. longi, squamis lanceolatis vel ovato-acuminatis stramineis instructi ; rhaches stipitibus similes. *Pinnae* anguste deltoideae, 15 mm. longae, basi 7 mm. latae, basilares minores, alte pinnatim lobatae, utrinque squamosae ; lobi acute serrati, interdum mucronati ; venae saepius unifurcatae. *Sori* saepius prope costam uniseriales ; indusia pallide straminea, tenuiter membranacea.

China. North-west Yunnan ; in shady pine forests on the eastern flank of the Lichiang range, lat. 27° 10′ N., 3060–3670 m. alt., *G. Forrest*, 2300.

XXXIV.—A REVISION OF THE GENUS CYCNOCHES.

R. A. Rolfe.

HISTORICAL.

The genus *Cycnoches* for many years proved an inexplicable puzzle to botanists. Soon after the original species was described, in 1832, Lindley recorded the occurrence of a second form which he had no doubt was a distinct species until both forms were produced on the same plant. A few years later a similar phenomenon was observed in a second species, by Bateman, and the only suggestion offered was that the genus was in a so-called sportive condition, as in the case of the allied genus *Catasetum*. Darwin concluded that *Catasetum* had three forms of flowers, male, female and hermaphrodite, and was tempted to believe that a similar condition of things prevailed in *Cycnoches*. The mistake in the case of *Catasetum* has already been pointed out (Rolfe in Journ. Linn. Soc. xxvii. pp. 206–225, t. 8) and the object of the present paper is to clear up the confusion into which the history of *Cycnoches* has fallen.

The genus *Cycnoches* was established by Lindley in 1832 (Gen. and Sp. Orch. p. 154) upon a plant which had been sent from Surinam by Lance to Messrs. Loddiges, and which flowered in their nursery in May and again in the winter of 1832. The generic name was given in allusion to the gracefully curved column resembling the neck of a swan, and the species was called *C. Loddigesii*. Lindley remarked that he had only seen a single expanded flower. It was shortly afterwards figured (Lodd. Bot. Cab. t. 2000).

In 1836, when speaking of the curious behaviour of the genus *Catasetum*, Lindley remarked (Bot. Reg. sub t. 1951*) " I am acquainted with the following example of this tendency in a very different genus. In August, 1836, Mr. Wilmer, of Oldfield, near Birmingham, sent me a specimen of a *Cycnoches*, which had broad petals, a short column, hooded and dilated at the apex, and a broad roundish lip, gibbous at the base, and with its stalk much shorter than the column. It was, however, destitute of scent, while *Cycnoches Loddigesii* has, as is well known, a delicious odour of vanilla. I had no doubt of its being a distinct species, and called it

C. cucullata. But in the autumn of 1836, in the garden of the Horticultural Society, a plant of *Cycnoches* produced from the opposite sides of the same stem two racemes ; those of one raceme were the well-known fragrant flowers of *Cycnoches Loddigesii*, and of the other the scentless flowers of the new *C. cucullata.*"

In 1837 a second species of *Cycnoches* was described and figured by Bateman (Batem. Orch. Mex. et Guat. t. 5) under the name of *C. ventricosum.* It had been introduced from the neighbourhood of Istapa, Guatemala, by Skinner, and flowered in Mr. Bateman's collection at Knypersley. The figure shows an inflorescence, flowers, now known to be males, and a seed capsule, the significance of which will be presently apparent. Mr. Bateman remarked : " The capsule represented in the drawing adhered to the plant on its arrival in this country, and a most interesting relic it is, the huge size of the seed vessel being scarcely less remarkable than the extreme minuteness of the seeds, with an innumerable quantity of which it was at one time filled."

A year later a third species appeared, and was described by Klotzsch under the name of *C. chlorochilon* (Otto und Dietr. Allg. Gartenz. vi. p. 225). It had been sent from Caracas by Moritz, and flowered at Berlin. Shortly afterwards it flowered with Messrs. Loddiges, and was figured (Lindl. Sert. Orch. t. 16). About the same time it was figured by Maund (Botanist, ii. t. 54) under the name of *C. ventricosum*, from a plant which is said to have flowered with Messrs. Loddiges in August, 1837. It is not, however, Bateman's plant of that name.

In 1840 another species was described by Lindley, under the name of *Cycnoches maculatum* (Bot. Reg. xxvi. (1840), Misc. p. 10). It flowered in the collection of Mr. Barker, of Birmingham, and though thought to be Mexican was evidently from Venezuela, for it is added, " The species has also been found in La Guayra, by one of the collectors employed by Messrs. Hugh Low & Co., of Clapton ; " a locality subsequently confirmed.

In July, 1842, Bateman figured another species (Batem. Orch. Mex. et Guat. t. 40) whose history is so remarkable that it is here transcribed verbatim. " Among Mr. Skinner's earliest Guatemala collections, attention was particularly directed to the specimens of a plant, which to the habit of a *Cycnoches* joined the long pendulous stems of a *Gongora*, and for the possession of which, in a living state, no small anxiety was entertained. Some plants were speedily transmitted by Mr. Skinner, but these, on flowering, proved to be merely the old *C. ventricosum.* A mistake was of course suspected, and Mr. Skinner being again applied to, sent over a fresh supply of plants, for the authenticity of which he vouched ; but these were scarcely settled in the stove, when flowers of *C. ventricosum* were again produced. Mr. Skinner being importuned for the third time, and being then on the point of returning to this country, determined to take one of the plants under his special care and protection during the voyage, which, flowering on the passage, seemed to preclude the possibility of further confusion or disappointment. The specimens produced at sea were exhibited, and the plant itself was placed in the stove at Knypersley, where it commenced growing with the utmost vigour. The season of flowering soon arrived, but

brought with it a recurrence of the former scene of astonishment and vexation, for the blossoms, instead of those of the coveted novelty, were not distinguishable from the old *C. ventricosum*. These were still hanging to the stem when the inexplicable plant sent forth a spike of a totally different character, and which was, in fact, precisely similar to the specimens gathered in Guatemala, and to those produced on the voyage. It is at present impossible to attempt any explanation of so strange a phenomenon, especially on the supposition that the two forms of flower are analogous to the male and female blossoms of other tribes, for *C. ventricosum* alone not unfrequently perfects seeds. The species (if as such it may be regarded) was named in honour of Sir Philip Egerton, before any of its eccentricities had been discovered, otherwise the compliment might have been deemed a dubious one."

A year later Lindley published a very interesting figure (Bot. Reg. xxix. (1843) Misc. pp. 75, 77, with woodcut) which should have thrown further light upon the subject. He remarked : "On the 15th of September last, I received from Robert Steyner Holford, Esq., of Westonbirt, near Tetbury in Gloucestershire, a flower-spike bearing flowers of *Cycnoches ventricosum* and *C. Egertonianum*, *intermixed;* it was exhibited at a meeting of the Horticultural Society, and I now produce a figure of it. The plant which bore this specimen had been purchased by Mr. Holford of Messrs. Rollissons of Tooting as *Cycnoches ventricosum*." The figure shows two purple flowers of *C. Egertonianum*, one green flower, which Lindley called "nearly *C. ventricosum*, but its lip here and there raised into warts," and two flowers in a transition state so far as the shape and colour of the sepals and petals are concerned. Lindley was unable to offer any explanation of the significance of the phenomenon, merely remarking that with such cases all ideas of species and stability of structure in the vegetable kingdom were shaken to their foundation.

For some years no further case of this so-called sporting was observed, though other species were successively described, and in 1852 Lindley gave an enumeration of the "so-called species of *Cycnoches*" (Paxt. Fl. Gard. iii. p. 6), nine in number, remarking that five of them had not been known to sport. Two, however, are now excluded from the genus.

In 1852 *Cycnoches Warscewiczii* was described by Reichenbach (Bot. Zeit. x. p. 734) on what, from internal evidence and from a flower preserved in Lindley's Herbarium, is now known to be the female of some species of *Cycnoches*, but the material for its certain identification is still wanting. The species afterwards figured under the same name is quite different.

The discovery of sexuality in the allied genus *Catasetum* threw the first ray of light upon the subject, but the matter was never cleared up, and Darwin, in 1862, commenting on the cases already mentioned, remarked (Fertilisation of Orchids, ed. 1, p. 269), "From the analogous differences in the labellum of the sexes in *Catasetum* we may believe that we here see the male, female, and hermaphrodite forms of the *Cycnoches*."

In 1879 another remarkable example appeared, and was exhibited at a meeting of the Royal Horticultural Society on October 14th,

by Mr. W. Bull, of Chelsea, and also recorded and figured (Gard. Chron. 1879, xii. pp. 493, 505, fig. 78) as follows:—"Mr. Bull received a Botanical Certificate for *Cycnoches Warscewiczii*, a curious Orchid with green flowers borne on two separate spikes, those on one spike being much larger and totally different in appearance one from the other—so much so, that, seen separately, they would be taken as belonging to different genera. The explanation of this and of similar appearances in various species of *Catasetum* is now known to be that they are male and female flowers respectively. In the present instance the flowers on the shorter spike with the broad segments and simple lip are probably female, while the smaller and more numerous flowers on the long raceme (cut short in the figure), and which have a much divided lip, are male." It is not, however, the *C. Warscewiczii* of Reichenbach.

In 1889 a plant of *Cycnoches pentadactylon*, Lindl. in the collection of Mr. E. Gotto, The Logs, Hampstead Heath, produced flowers of both sexes, and a figure of each was published (Rolfe in Gard. Chron. 1889, vi. p. 188, fig. 26).

In 1891 a new species was described from the collection of Mr. H. J. Ross, of Florence, under the name of *C. Rossianum*, Rolfe (Gard. Chron. 1891, ix. p. 456). It had been purchased under the name of *C. Warscewiczii*, and had flowered on various occasions before January, 1889, when a female flower was produced and was sent to Kew for determination. Its origin was not known at the time, but the subsequent production of male flowers and the discovery that there was only a single plant of *Cycnoches* in the collection revealed its identity. This was the first species described from materials of both sexes.

In 1891 the female of *Cycnoches chlorochilon* appeared in two different collections. In June of that year M. Houzeau de Lehaie, Hyon, near Mons, Belgium, sent to Kew male and female flowers of a *Cycnoches* received from Caracas. The male was the well-known *C. chlorochilon*, and though borne on a different plant there was little doubt that the female belonged to the same species. A month later both kinds of flowers appeared in an importation by Messrs. Sander, of St. Albans, but the three females were in each case borne on separate plants. Shortly afterwards, however, both sexes appeared on the same plant in M. Houzeau's collection, thus confirming their specific identity (Rolfe in Gard. Chron. 1891, x. pp. 69, 394).

By this time it had become increasingly evident that some mistake had been made with respect to *C. Egertonianum*, though materials were not forthcoming to clear up the mystery of Bateman's figure, which it was now certain showed two different kinds of male flowers on the same pseudobulb. Shortly afterwards the receipt of male flowers of another species afforded an opportunity for a comparison of all the materials available, and a re-perusal of Bateman's story suggested an explanation, namely that the green flowers shown on Bateman's plate were not drawn from the flowers direct, but were borrowed from an earlier drawing. The production of two kinds of male flowers on the same pseudobulb, as shown by Bateman, was certainly anomalous, and the remark that the flowers of "the old *C. ventricosum*" were "still hanging to the stem" when those

of the true *C. Egertonianum* appeared, and the fact that a similar confusion had led Darwin to the erroneous belief that there were three sexual forms of *Catasetum*, suggested the inference. These conclusions were published (Gard. Chron. 1892, xi. pp. 204, 205), when it occurred to me to write to Mr. Bateman, who was still living, and who replied that he remembered the circumstance perfectly, and the commotion it caused, but could not recollect exactly how the drawing was made, though with regard to all the circumstances mentioned he was inclined to concur in the suggested explanation. "As to the withered flowers," he added, "they remained many months on the plant, and were seen by many people, including Sir Philip Egerton, after whom the species was called." It is unfortunate that they were not preserved, or the mystery might have been cleared up earlier.

Confirmation of this view came about three years later. In the autumn of 1894 a living plant of a *Cycnoches* was received from the late Mr. Ricardo Pfau, of Costa Rica, and in the following spring a young growth appeared on the top of the old pseudo-bulb, which was taken off and potted, and the two plants were grown on side by side. In April, 1895, one of them produced a long raceme of purple flowers, which were identical with *C. Egertonianum*, Batem., while in June two green flowers, which it had been apparent for some time were females, expanded on the other plant (Rolfe in Orch. Rev. 1895, p. 233). One of these flowers is represented in the annexed figure (fig. 4), and a glance will show how distinct it is from the male of *C. ventricosum* (fig. 1), though the flowers are green in both. The illustration of the female of *C. ventricosum* (fig. 2) is taken from a sketch in Lindley's Herbarium, which is labelled, "Nat. size, Sir P. Egerton, Aug. 30/49," and is accompanied by a dried female flower, labelled "Sir P. Egerton, Oct. 1849." The male of *C. Egertonianum* is purple, much smaller than the other sex, and of totally different shape (fig. 3). The figures are approximately natural size.

Two other female *Cycnoches* have since appeared in cultivation, which cannot be certainly identified, though for geographical and other reasons they are suspected to belong to *C. maculatum*, Lindl., and *C. peruvianum*, Rolfe, while an additional Colombian species has been described, namely *C. densiflorum*, Rolfe (Kew Bulletin, 1909, p. 63), from a plant in the collection of the Rev. J. C. B. Fletcher, Mundham Vicarage, Chichester, which recently produced flowers of both sexes. A figure of the latter has been prepared for the Botanical Magazine (t. 8268).

THE SECTIONS OF CYCNOCHES.

It is unfortunate that the flowers produced by Bateman's plant were not preserved, for had this been the case the error would have been detected earlier. In 1891 I had indicated that the genus contained two distinct sections, one in which the two sexes were very similar in the perianth, the other in which they were very diverse (Gard. Chron. 1891, x. pp. 69, 70), though I then failed to detect the confusion between *C. ventricosum* and *C. Egertonianum*, and enumerated them as sexes of the same species. A few months

Fig. 1, male of *Cycnoches ventricosum* ; fig. 2, female.
Fig. 3, male of *Cycnoches Egertonianum* ; fig. 4, female.

later the error was discovered, and it was pointed out that not only were the two distinct but that they belonged to different sections of the genus, which were then named *Eucycnoches* and *Heteranthae* (Gard. Chron. 1892, xi. p. 205).

The two sections are distinguished by very marked differences in the perianth of the males—the females are similar in both except as regards size, and some minor differences in shape and colour. In *Eucycnoches* (which contains the original species of the genus) the sepals, petals and lip are fairly similar in the two sexes, though there are slight differences in size and texture. In the sexual organs the differences are very marked. In the male the column is very long and slender, and arched like the neck of a swan (in reference to which the generic name was given), bearing the anther at the summit, without a stigma or column wings, while the ovary is reduced to a simple pedicel. In the female the column is very short and stout, with a normal stigma, protected by a pair of triangular fleshy wings, without an anther, while the pedicel is much stouter than in the male, from the fact that it contains the incipient ovary. In the section *Heteranthae* the female is shaped as in *Eucycnoches*, but the male is usually very much smaller, the sepals and petals much thinner in texture, soon becoming recurved after expansion, and in some cases markedly different in colour, while the lip is reduced to a small, usually rounded disc, margined with clavate teeth. These characters are shown in the figures. Correlated with the smaller size of the males we find a greatly increased number of flowers, which are borne in a long pendulous raceme.

ENUMERATION OF SPECIES.

Section 1. Eucycnoches.

A. Both sexes known.

1. ♂ **Cycnoches Loddigesii**, *Lindl.* Gen. & Sp. Orch. (1832), p. 154 ; Lodd. Bot. Cab. t. 2000 ; Lindl. Bot. Reg. t. 1742 ; Kn. & Westc. Flor. Cab. i. p. 29, t. 15 ; Bot. Mag. tt. 3855, 4215 ; Hook. Cent. Orch. p. 43, t. 48 ; Harting. Parad. p. 21, t. 36 ; Lindenia, x. t. 436 ; Orch. Rev. 1907, p. 25, fig. 4.

♀ *C. cucullatum*, Lindl. in Bot. Reg. xxiii. (1837), sub t. 1951*; Rolfe in Orch. Rev. 1894, pp. 277, 354.

Native of Surinam.

2. ♂ **Cycnoches ventricosum**, *Batem.* Orch. Mex. et Guat. (1837), t. 5 ; also the green flowers shown on t. 40.

C. chlorochilon, Bean in Gard. Chron. 1888, iv. p. 326 (non Klotzsch).

♀ *C. ventricosum*, Batem. ; Rolfe in Gard. Chron. 1892, xi. p. 205 (in note).

Native of Guatemala.

Most of the figures published under this name belong to *C. Egertonianum*, Batem., but that of Maund represents *C. chlorochilon*, Klotzsch. The female was received from Sir Philip Egerton in 1849, and is preserved in Lindley's Herbarium, but I find no record of it at the time, and although it was then thought to be ordinary *C. ventricosum*, the short column might have invited remark.

3. ♂ **Cycnoches chlorochilon**, *Klotzsch* in Otto & Dietr. Allg. Gartenz. vi. (1838), p. 225; Lindl. Sert. Orch. t. 16; Harting. Parad. p. 21, t. 35, fig. 2; Will. Orch. Alb. vi. t. 263; Gard. Chron. 1888, iii. pp. 144, 145, fig. 24; Ill. Hort. 1888, p. 81, t. 65; Reichenb. ser. 2, i. p. 83, t. 39, with fig. in text; Orchidoph. 1893, pp. 52, 53, with fig.; Journ. Hort. 1897, xxxv. p. 285, fig. 41; Rev. Hort. Belge, 1899, p. 25, with plate; Orchis, i. p. 60, t. 8.

C. ventricosum, Maund Bot. ii. t. 54 (non Klotzsch); Ann. de Gand, iv. t. 187.

♀ *C. chlorochilon*, Klotzsch; Rolfe in Gard. Chron. 1891, x. pp. 69, 394; Reichenb. ser. 2, i. p. 83, with fig. in text.

Native of Venezuela, Colombia and Surinam.

B. Male only known.

4. **Cycnoches Lehmanni**, *Reichb. f.* Otia Bot. Hamb. (1878), p. 10.

Native of Ecuador.

5. **Cycnoches Haagei**, *Rodr.* Gen. et Sp. Orch. nov. ii. (1881), p. 221; Bot. Mag. t. 7502; Cogn. in Mart. Fl. Bras. iii. pars v. p. 450, t. 91.

Native of Brazil.

6. **Cycnoches versicolor**, *Reichb. f.* in Gard. Chron. 1888, iv. p. 596; Cogn. in Mart. Fl. Bras. iii. pars v. p. 451.

Native of Brazil, and very nearly allied to *C. Haagei*, Rodr.

Section 2. Heteranthae.

A. Both sexes known.

7. ♂ **Cycnoches Egertonianum**, *Batem.* Orch Mex. et Guat. (1842), t. 40 (in part); Lindl. in Bot. Reg. xxix. (1843), Misc. pp. 75, 77, with fig.; Gard. Chron. 1843, p. 775, with fig.; Rolfe in Orch. Rev. 1907, p. 337, fig. 37; 1908, pp. 296, 297, fig. 38, 39.

C. ventricosum, Lindl. in Bot. Reg. xxix. Misc. pp. 75, 77, with fig.; Gard. Chron. 1843, p. 775, with fig.; Ann. de Gand. iv. p. 129, with fig.

C. ventricosum var. *Egertonianum*, Hook. in Bot. Mag. (1844), t. 4054; Hook. Cent. Orch. p. 44, t. 49.

♀ *C. ventricosum*, Lindl. in Bot. Reg. xxix. Misc. pp. 75, 77, with fig.; Gard. Chron. 1843, p. 775, with fig.; Ann. de Gand. iv. p. 129, with fig.

C. Egertonianum, Batem.; Rolfe in Orch. Rev. 1895, p. 233; 1908, p. 296, fig. 38.

Native of Guatemala.

This species has been much confused with *C. ventricosum*, Benth., belonging to the earlier section of the genus, as the above references show.

8. ♂ **Cycnoches pentadactylon**, *Lindl.* in Bot. Reg. xxix. (1843) Misc. p. 18, t. 22; Gard. Chron. 1889, vi. p. 188, fig. 26; 1893, xiii. pp. 597, 599, figs. 87, 88; 1909, xlv. p. 27, fig. 20; Journ. Hort. 1893, xxvi. pp. 94, 95, fig. 14; Gard. Mag. 1893, p. 77, with fig.; Bull. Soc. Tosc. Ort. 1893, p. 44, t. 2; Orch. Rev. 1893, p. 73, fig. 4; Cogn. in Mart. Fl. Bras. iii. pars v. p. 152, t. 92.

C. Amesianum, Hort. in Gard. Chron. 1902, xxxi. p. 218.

♀ *C. pentadactylon*, Lindl. ; Rolfe in Gard. Chron. 1889, vi. p. 188, fig. 26 ; 1893, xiii. pp. 597, 599, fig. 89 ; 1909, xlv. p. 27, fig. 20 ; Cogn. in Mart. Fl. Bras. iii. pars v. p. 452, t. 92.

9. ♀ **Cycnoches stelliferum**, *Lodd.* Cat. Orch. (1844), p. 25 (nomen) ; Lindl. Bot. Reg. xxxii. sub t. 46.

C. Egertonianum var. *viride*, Lindl. in Bot. Reg. xxxii. (1846), t. 46 ; Day Orch. Draw. lii. t. 21.

C. Warscewiczii, Hort. in Gard. Chron. 1879, xii. pp. 493, 505, fig. 78 ; 1909, xlv. pp. 27, 29, fig. 21 ; Fl. Mag. 1879, t. 381 ; Orchidoph. 1881, pp. 101, 102, with fig. ; Pfitzer Verg. Morph. Stud. Orch. p. 6, t. 1 ; Day Orch. Draw. xxv. t. 75.

♀ *C. Warscewiczii*, Hort. In each of the figures cited in the preceding paragraph the female flowers are also shown.

Native of South Mexico.

Quite distinct from *C. Warscewiczii*, Reichb. f., which I believe is the female of the following species.

10. ♂ **Cycnoches aureum**, *Lindl.* in Paxt. Fl. Gard. iii. (1852–3), p. 6, t. 75 ; Lem. Jard. Fleur. iii. t. 264.

♀ ? *C. Warscewiczii*, Reichb. f. in Bot. Zeit. x. (1852), p. 734 (non alior.).

Native of Central America.

The relationship of these two plants is a matter of inference. An authentic flower of *C. Warscewiczii*, Reichb. f., is preserved in Lindley's Herbarium. It was collected at Chiriqui, where Warscewicz also, according to Reichenbach, collected *C. aureum*. Lindley's Herbarium also contains part of an inflorescence with two male flowers, labelled by Reichenbach " *Cycnoches aureum*, Chiriqui Vulc., 6–8,000 feet, Oct., Warscewicz." *C. Warscewiczii*, Reichb. f., is almost twice as large as the female of the preceding species, which has been confused with it. Reichenbach himself suggested that his *C. Warscewiczii* might be a sex of *C. ventricosum*, Batem. (Walp. Ann. vi. p. 560).

11. ♂ **Cycnoches Rossianum**, *Rolfe* in Gard. Chron. 1891, ix. p. 456.

♀. The female was described at the same time.

Native of South Mexico and Central America.

12. ♂ **Cycnoches densiflorum**, *Rolfe* in Kew Bulletin, 1909, p. 63 ; Orch. Rev. 1909, p. 104, fig. 9 ; Bot. Mag. t. 8268.

C. glanduliferum, Rolfe in Gard. Chron. 1892, xi. p. 204 (non Rich et Gal.).

C. maculatum, Hort. in Gard. Chron. 1909, xlv. pp. 26, 27, fig. 19 (non Lindl.).

♀. The female was described and figured at the same time.

Native of Colombia.

B. Male only known.

13. **Cycnoches maculatum**, *Lindl.* Bot. Reg. xxvi. (1840), Misc. p. 10 ; Lindl. Sert. Orch. t. 33 ; Maund Bot. iv. t. 155 ; Ill. Hort. xx. p. 168, t. 143.

Native of Venezuela.

14. Cycnoches Dianae, *Reichb. f.* in Bot. Zeit. x. (1852), p. 636.
Native of Central America.

15. Cynoches glanduliferum, *Rich. et Gal.* ex Hemsl. in Gard. Chron. 1879, xi. p. 268.
Native of Mexico.
The plant shown in Richard's original drawing in Herb. Mus. Paris shows a pendulous raceme of four male flowers, but a detached fruit is also shown. Nothing further is known about the species.

16. Cycnoches peruvianum, *Rolfe* in Lindenia, vii. (1891) p. 29, t. 301.
Native of Peru.

Females of doubtful identity.

Cycnoches peruvianum, *Rolfe?*—In October, 1895, a female flower of Cycnoches was sent by Messrs. Sander & Co., St. Albans, which was said to have been imported with *C. peruvianum*, Rolfe, and may therefore belong to that species.

Cycnoches maculatum, *Lindl.?*—In October, 1903, a female flower of Cycnoches was sent by Messrs. Charlesworth & Co., Bradford, which is said to have been imported with *C. chlorochilon*, Klotzsch. It is not the female of that species, but as *C. maculatum*, Lindl., is known to grow with *C. chlorochilon*, and as the female sent has the sepals and petals spotted with brown, it is just possible that it may be the unknown female of that species.

SPECIES EXCLUDED FROM THE GENUS.

Cycnoches barbatum, Lindl. = Polycycnis barbata, Reichb. f.
C. Lehmanni, Nichols. = Lueddemannia Lehmanni, Reichb. f.
C. musciferum, Lindl. = Polycycnis muscifera, Reichb. f.
C. Pescatorei, Lindl. = Lueddemannia Pescatorei, Reichb. f.

XXXV.—MISCELLANEOUS NOTES.

Padi.—In connection with an investigation which is being carried out, at the Institute for Medical Research, Kuala Lumpur, F.M.S., by Dr. H. Fraser on the subject of Beri-beri, twenty-one samples of rice, collected by Dr. Fraser, were brought to the Jodrell Laboratory early in the year for examination. In the following list particulars of the various samples are given. Sir Patrick Manson, K.C.M.G., F.R.S., at whose instance the examination of these samples was undertaken and to whom a copy of the report on the samples has been communicated, writes that he has been informed that since "cured" rice has been adopted as the only form of rice in use in Government Institutions in the Straits Settlements and Federated Malay States, Beri-beri has disappeared from them. Sir Patrick Manson considers that it is desirable to publish the results of the examination of these samples.

List of Samples of Rice.

I. Untreated padi.
II. Padi after soaking 48 hours. Sent to laboratory wet.
III. Padi after soaking 48 hours and steaming. Dried in sun.
IV. Parboiled rice. Indian.
V. Parboiled rice. Penang.
VI. Parboiled rice. Asahan.
VII. White rice. Siam No. i.
VIII. White rice. Siam No. ii.
IX. White rice. Rangoon.
X. Malay rice. Usual Kampong variety.
XI. Malay rice. "Bras merah."
XII. Malay rice. "Bras hitan."
XIII. Malay rice. "Bras pulat."
XIV. Padi before soaking—in gum solution.
XV. Padi after soaking—in gum solution.
XVI. Padi after soaking, steaming and drying—in gum solution.
XVII. Parboiled rice. Indian—in gum solution.
XVIII. Parboiled rice. Penang—in gum sulution.
XIX. White rice. Rangoon „ „
XX. Malay rice. „ „
XXI. White rice. Siam „ „

A number of rice-grains from the samples left at the Jodrell Laboratory by Dr. H. Fraser, Institute for Medical Research, Kuala Lumpur, F.M.S., have been examined, with the following results.—

Untreated padi, padi after soaking, and padi after soaking and steaming (samples I–III, XIV–XVI) show no distinct difference in the amount or distribution of the oil. The aleurone layer contains a considerable amount of oil; in the rest of the endosperm there is very little. Small drops of oil were found here and there in the cells of the outer layers of the endosperm, but usually none deeper than 3–4 layers beneath the aleurone-layer.

In the rest of the samples the aleurone-layer (as well as the fruit-wall, &c.) has been removed to a varying extent, only small remnants of it being left in some of the samples. In some cases (e.g. VII) this appears to have been done by some mechanical process, while in others (e.g. XI and XII) the partial removal of the aleurone-layer has evidently been effected by mites or weevils (one or both). In No. IV two living weevils and numerous living mites were found, and in some of the other samples living or dead mites were abundant, as well as an accumulation of their excrement. The excrement was specially abundant in Nos. IV and XII, and it appears to contain practically no oil. It seems probable, therefore, that, when rice is stored for some time, a great part of the oil may be removed, in consequence of mites, &c., feeding on the aleurone-layer.

In some of the cases in which the aleurone-layer was fragmentary (X, XI) it was found that a few fungal hyphae were occasionally present in cells of the aleurone-layer, but these hyphae were not abundant, and were probably of no particular significance. In X, XI and XII, of such aleurone-cells as were present, many contained only a very little oil.

One per cent. osmic acid was used to show the distribution of the oil. Chlorophyll solution and alkanna solution were used for comparison, the staining being carried out rapidly to avoid dispersal of the oil by the spirit.

There appear to be four or more varieties of rice among the samples. This might account for different amounts of oil being found, even in samples with intact aleurone layer.

Two suggestions may be made as a result of the examination :—

(1.) Can parboiling be advantageous in killing any mites, &c., present?

(2.) It may be possible that the excrement of the mites contains poisonous compounds, which would be injurious, if the powdery excrement were cooked with the rice.

L. A. B.

Botanical Magazine for June.—*Pinus Jeffreyi*, Grev. & Balf., is a Western North American species closely allied to *P. ponderosa*, Laws., some authorities regarding it as only a variety, differing in having longer, more rigid and more persistent leaves, yellow-green male flowers, and larger purple cones. Seeds of this Pine were first sent to Edinburgh in 1852, having been collected by J. Jeffrey in the Shasta Valley, North California. The drawing has been prepared from a tree grown at Kew. *Begonia modica*, Stapf, was first described last year in the Kew Bulletin from material sent to Kew by Mr. J. Anderson, and collected by him in the Gold Coast Colony. It flowered for the first time at Kew in September, 1908. It is a small-growing species, almost stemless, with peltate leaves, and small yellow flowers having two sepals and no petals. *Sorbus cuspidata*, Hedlund, is, from the size of its leaves and flowers, the finest of all the Whitebeams in cultivation, but though an old inhabitant of gardens in this country, having been introduced nearly eighty years ago, it is rarely seen of large size. In the Temperate Himalaya it is widely distributed, and sometimes attains large dimensions. The plate was prepared from a tree purchased from Messrs. Fisher, Son & Sibray, in 1904, under the name of *Pyrus Aria himalaica*. *Prunus japonica*, Thunb., from China and Japan, closely resembles *P. humilis*, Bunge, figured at t. 7335 of the Magazine, but it may be easily distinguished from that species by its glabrous branches, larger leaves and entire petals. Its bright red, cherry-like fruits are about $\frac{2}{5}$ in. in diameter and are extremely acid and astringent. The plate was prepared from a plant presented by Messrs. James Veitch & Sons in 1902. *Cornus macrophylla*, Wall., is distributed from the North-West Himalaya eastward to China and Japan. It reaches a height of about 17 feet in cultivation, and is the largest of the Cornels quite hardy in this country. The same plant was described by C. A. Meyer, as *C. brachypoda*, and much confusion has been caused by applying Wallich's name, which belongs to a species with opposite leaves, to a distinct plant with alternate leaves. To the latter the name *C. controversa*, Hemsl., has been given.

Illustrations of Cyperaceae.—When the publication of the diagnoses of the new genera and species of *Cyperaceae*, left in manuscript by the late Mr. C. B. Clarke, was announced (*Kew Bulletin* for 1908, p. 376), reference was made to the fact that Mr. Clarke, some years before his death had printed 144 plates of *Cyperaceae*, with corresponding explanatory text. As these plates aid in elucidating the views held by Mr. Clarke with regard to the systematic arrangement of the genera of *Cyperaceae*, a hope was expressed that these plates might be issued to the public as supplementary to the diagnoses of the genera and species published in *Kew Bulletin*, *Additional Series*, viii.

It has now to be announced that this hope has been fulfilled. On the appearance of the volume referred to, the executors of the late Mr. Clarke, decided to issue these plates at a nominal price with the object of placing at the disposal of botanists a further instalment of the results of his prolonged study of this natural family. The issue of the plates has been entrusted to Messrs. Williams and Norgate, who publish them in a well got up volume,* with an introductory note by Mr. B. Daydon Jackson, to whom, as has already been explained in this *Bulletin*, the task of collecting and editing the descriptions published last year, along with the scheme of arrangement adopted by Mr. Clarke in his manuscript monograph, had been entrusted. This introductory note explains that the series of plates was prepared "when the author had deter-"mined, not only upon his plan of arrangement, but also the repre-"sentative and typical species in each genus. They were drawn by "various artists, such as Mr. N. E. Brown, A.L.S., Miss Matilda "Smith, and Mr. Charles Fitch; the greater part were reproduced "by the collotype method, but some were lithographed." The explanatory page of text which faces each plate, supplies information concerning the figures, and in very many cases also regarding the specimens from which they were derived.

The plates thus possess an authoritative character, and the volume forms an indispensable complement to the eighth volume of the *Kew Bulletin*, *Additional Series*. The ordinal "Index Tabularum," supplied by Mr. Clarke with which the volume opens, has been supplemented by an alphabetical index at the end which adds greatly to the value of the work.

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* Illustrations of Cyperaceae: prepared under the direction of the late Charles Baron Clarke, F.R.S., some time President of the Linnean Society of London: London (Williams & Norgate), 1909. Price 12s. 6d. net. Title, preface, Index Tabularum, pp. i.–ix. 144 plates, and as many leaves of explanation. Index, pp. 1–6.